J.D. Irving Ltd. – Queens-Charlotte License #6

Forest Management Plan

2002-2026

THE QUEENS-CHARLOTTE LICENSE (#6)

2002 – 2026 MANAGEMENT PLAN

Prepared by: J. D. IRVING, LIMITED

Submitted for review and approval to the New Brunswick Department of Natural Resources and Energy as specified in the document "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management" as required under the New Brunswick Crown Lands and Forests Act.

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The Queens-Charlotte License (#6)
2002-2026 Management Plan
January, 2002

EXECUTIVE SUMMARY

As specified and required by the New Brunswick Department of Natural Resources and Energy (DNRE); J. D. Irving, Limited (JDI) has prepared a 2002-2026 Management Plan for the Queens-Charlotte License (#6). This Management Plan meets the philosophy, principles and objectives of the DNRE as noted in the March 10, 2000 document: "**A Vision for New Brunswick's Forests...Goals and Objectives for Crown Land Management**". The plan has been developed through detailed discussions with DNRE and JDI staff. We believe the proposed strategy and management plan is ecologically sustainable, economically viable and socially responsible; while achieving DNRE's goals and objectives for Crown land management in New Brunswick.

This Queens-Charlotte License Management Plan is based upon an updated forest inventory, new ground plot data and improved growth and yield information. Operational and technological advances in forestry practices have also been incorporated into the strategy. A thorough analysis of impacts and benefits of different objectives and alternative strategies has been undertaken using the "Woodstock®" wood supply model and other forecasting tools.

For the new 2002 management-planning period, DNRE has introduced several significant new objectives. These include:

- eco-region-based forest community objectives,
- additional habitat objectives,
- aesthetic buffer zones along public highways, and
- establishment of several large proposed "Protected Areas" on Crown land.

Improved stratification, new photo interpretation for part of the land base, and a greatly expanded network of ground plot information; has provided a foundation and basis for the development of new growth and yield curves for the Queens-Charlotte License. A result of these improvements has been higher average yields and an increased growing stock on the License compared to the previous 1997 plan.

A reduced reliance upon clear-cut harvesting; and more use of shelterwood, commercial thinning and uneven-aged management prescriptions are other significant changes to the strategy proposed in our 2002 Management Plan.

Our Management Plan is able to achieve the vast majority of the new eco-region based forest community objectives desired by DNRE; however, due to the present levels of several specific forest communities on the License, the targets could not be totally achieved.

Those specific eco-region level objectives that could not be met in each and every 5-year period include:

- the "OSFH" block objective of 1,760 hectares for Eco-region 3
- the 'OSFH" block objective of 1,330 hectares in Eco-region 4
- the "OSFH" block objective of 9,980 hectares for Eco-region 6
- the "OSFH" block objective of 1,810 hectares in Eco-region 7
- the "THSW objective of 280 hectares for Eco-region 4
- the "THSW objective of 2,610 hectares for Eco-region 6
- the "THSW objective of 610 hectares for Eco-region 7
- the "BF" objective of 310 hectares for Eco-region 3.

We do not consider the "shortfalls" to be serious issues because these habitats simply are not present on the License at this time under the present broad forest stratification. We will however; identify, maintain, and designate up to the necessary area of THSW stands meeting the criteria that we encounter in our operations.

In order to achieve the Crown land management objectives established by DNRE, we divided the Queens-Charlotte License into six spatially distinct and discrete zones. Listed in order of prioritization, these include:

- Proposed "Protected Areas",
- Unique Areas and Reserves,
- Deer Wintering Area Management Units,
- "Old Spruce/Fir Habitat" blocks,
- Watercourse and Highway Buffers, and
- the "General Forest Zone".

The five zones where timber is not the primary management objective comprise approximately 26% of the Queens-Charlotte License area.

The proposed spruce/fir/jack pine harvest level of 628,500 m^3/yr from the total Queens-Charlotte License is 8% above the 1997 Management Plan level. Our analysis indicates that by year 2050, it will be possible to further increase the spruce/fir/Jack Pine harvest by 35%.

The proposed hardwood harvest level of 278,300 m^3/yr is 26% greater than the previous plan. This is however, an accelerated hardwood harvest level, proposed for silvicultural reasons. We plan to reduce the hardwood harvest to a long term sustainable level of 230,000 m^3/yr at year 2017.

The projected White Pine saw log harvest level of 34,400 m^3/yr is 42% less than the present allocation levels and 6% less than the previous plan. It is important to note that we have incorporated a relatively intensive white pine management strategy into this Queens-Charlotte License Plan, with an objective of maximizing the allowable harvest level. This serious allocation shortfall will need to be addressed by DNRE.

The expected "fallout" volume of Cedar saw material in this new Management Plan (12,800 m^3/yr) is a reduction of 36% compared to the present allocation levels. It must also be noted that this fallout volume is well above the estimated long term sustainable Cedar saw material yield of 4,800 m^3/yr. The issue of Cedar sustainability and Cedar allocation levels must also be rationalized.

The proposed AAC levels by species group and forest zone is summarized in Table i.

Table i. Harvest levels on the Queens-Charlotte License for the 2002-2006 management plan period.

Forest Zone	Harvest Levels (m^3/year)			
	Spruce/Fir/Jack Pine	Hardwood	White Pine Saw logs	Cedar Saw Material
General Forest	598,000	267,000	32,600	12,300
Protected Areas[1]	3,000	2,300	200	100
Unique Areas	600	200	200	100
DWAMUs	9,400	4,800	900	0
OLDSF Blocks	5,500	1,500	200	100
Watercourse Buffers	12,000	2,500	300	200
Total License	628,500	278,300	34,400	12,800

[1] Volume level is for 5 years only (2002-2006)

Our proposal also outlines a tree planting and pre-commercial thinning program of 6,529 hectares. This level is approximately 9% above the previous Plan levels, but 30% less than the 1997-2000 levels actually undertaken. The silviculture levels proposed (by forest zone) in our strategy are summarized in the following table (Table ii).

Table ii. Required silviculture levels on the Queens-Charlotte License for the 2002-2026 management plan period.

Forest Zone	Proposed Silviculture Level (hectares/year)				
	Planting	Pre-commercial Thinning			
		Softwood	Mixedwood	Hardwood	Pct Total
General Forest Zone	3,161	2,321	669	220	3,210
Protected Areas	0	0	0	0	0
Unique Areas	0	0	0	0	0
DWAMU's	20	60	0	0	60
OLDSF Blocks	43	35	0	0	35
Watercourse Buffers	0	0	0	0	0
Total License	3,224	2,416	669	220	3,305

A brief comparison of total harvest and silviculture levels for previous Management Plans and our proposal for the Queens-Charlotte License is summarized in the following table:

Table iii. Comparison of 1993, 1997 and proposed 2002 Queens-Charlotte License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)	
	Spruce/Fir /Jack Pine	Hardwood	White Pine Sawlogs	Cedar Highgrade Products	Planting	Pre-commercial Thinning
1993	540,500	177,500	30,000	22,125	1,940	1,430
1997	581,500	220,700	36,300	14,000	2,430	3,550
2002	628,500	278,300	34,400	12,800	3,224	3,305

In preparing for and developing this 2002-2026 Management Plan for the Queens-Charlotte License many important issues and concerns have been reviewed and discussed. As a result, we have made several serious recommendations to further improve future management processes, procedures and results. Our recommendations are as follows:

- We recommend that DNRE adopt a policy to increase the White Pine AAC from Crown land, by practicing White Pine management in appropriate areas, and committing to an intensive White Pine silviculture program.

- We recommend that DNRE and the Cedar-using industry review the issue of Crown land Cedar allocations and cedar resource sustainability.

- We recommend that DNRE consider recognizing commercial thinning prescription costs, and silvicultural benefits; by providing a per hectare silvicultural reimbursement, or by providing a reduced royalty for commercial thinning.

- We recommend that DNRE ensure they are committed to provide funding for the total silviculture program prescribed in this Management Plan, including providing sufficient seedlings, and providing funding and approval to maintain all (past and present) planted areas free to grow.

- We recommend that DNRE mitigate the loss to the working forest caused through the establishment of 22,653 hectares of "Protected Areas" on the Queens-Charlotte License; by incorporating unallocated adjacent Crown lands into the Queens-Charlotte License.

- We recommend that DNRE review the status of the unallocated Crown forestland in the province, and as required under the Crown Lands and Forest Act, incorporate these areas

into the adjacent Crown Licenses.

- We recommend that DNRE staff review and revise the definition of, criteria for, and management objectives related to "moderate winter deer habitat" within DWAMU's.

- We recommend that DNRE staff, in consultation with Licensees, develop alternative streamlined management plan requirements for very small (less than 100 hectares in size) DWAMUs.

- We recommend that DNRE staff, in consultation with Licensees, review and revise the OSFH block criteria and objectives.

- We recommend that DNRE review the updated forest inventory and establish more realistic and achievable forest community level objectives for the Queens-Charlotte License.

- We recommend that all levels of DNRE (Branch, Region and District) have the opportunity to review and comment on this Management Plan, prior to its approval by DNRE senior management.

- We recommend that the government of New Brunswick adopt a policy that "All land use decisions and Crown land Management objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land."

- We recommend that the government of New Brunswick establish Crown License Management objectives and related performance criteria focussed on doubling the sustainable harvest by 2040.

Over the past two years we have submitted evolving drafts of our proposed 2002-2026 management strategy and plans for the Queens-Charlotte License to DNRE for review. We have considered the comments received and have revised our strategy and proposed management plan accordingly.

We believe that this blocked 25-year Management Plan for the Queens-Charlotte License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management. We are confident that we can implement this strategy on the ground consistent with DNRE's present policies and procedures. We are proud of this Management Plan and we feel that it is environmentally, economically, and socially responsible.

J. D. Irving, Limited
January 21, 2002

INTRODUCTION

It is required under the New Brunswick Crown Lands and Forests Act, that each Licensee develop and revise a 25-year Management Plan for the License they manage. The first Management Plans were prepared in 1982, and have been revised every five years since.

This document is J. D. Irving, Limited's (JDI) 2002-2026 Management Plan for the Queens-Charlotte License (#6). This plan outlines a strategy for management of the Queens-Charlotte License in order to meet the philosophy, principles, and objectives of the New Brunswick Department of Natural Resources and Energy (DNRE) as noted in the March 10, 2000 document: "A Vision for New Brunswick's Forests . . . Goals and Objectives for Crown Land Management" (Appendix I).

This plan has been developed through detailed discussions with DNRE and JDI staff, along with input from other stakeholders. This management plan outlines a strategy that is ecologically sustainable, economically viable and socially responsible; while achieving DNRE's goals and objectives for Crown land management in New Brunswick.

The 2002-2026 Management Plan for the Queens-Charlotte License is based upon an updated forest inventory, and new ground plot data to improve growth and yield information. Operational and technological advances in forestry practices have also been incorporated into the management strategy proposal. A thorough analysis of impacts and benefits of the different objectives and potential strategies has been undertaken using the "Woodstock®" wood supply model and other forecasting tools, in order to develop this proposal.

For the new 2002 management-planning period, DNRE has introduced several significant new objectives. These include:

- eco-region-based forest community objectives,
- additional habitat objectives,
- aesthetic buffer zones along public highways, and
- establishment of several large proposed "Protected Areas" on Crown land.

Each of these newly introduced objectives further constrains and has the potential to reduce the Annual Allowable Cut (AAC) from the License, compared to previous Management Plans.

Improved stratification, new photo interpretation for part of the land base, and a greatly expanded network of ground plot information; has provided a foundation and basis for the development of new growth and yield curves for the Queens-Charlotte License. A result of these improvements has been higher forecast yields and an increased growing stock for spruce, and most hardwood species on the License, compared to the previous 1997 plan.

A reduced reliance upon clear-cut harvesting; and higher utilization of shelterwood harvesting, commercial thinning and uneven-aged management prescriptions are another significant changes to the strategy proposed for the 2002 Management Plan period. The change in strategy is due in part to:

- improved health and vigor of the forest,
- better markets for low grade hardwood products,
- maturing silviculture treatments (planting and thinnings),
- a greater proportion of the land base in non-timber primary management zones, and
- an improved level of ecological sophistication in our management prescriptions.

Even within our clear-cut harvest prescriptions, we are placing a greater emphasis on the importance of maintaining sufficient structural and biological diversity.

A brief Glossary of terms utilized in this Management Plan, has been prepared, and is included as Appendix II. For more thorough and detailed definitions we would suggest referring to documents such as Natural Resources Canada's "Silvicultural Terms in Canada."

Our 2002-2026 Queens-Charlotte License Management Plan outlines a strategy that increases the spruce/fir/jack pine AAC by 8% compared to the 1997 levels and provides a 26% increased hardwood AAC. There is however, a reduced White Pine saw log (-6%) and Cedar Saw material (-9%) availability. It should also be noted that the cedar fallout forecast for the next 5 years is not sustainable in the long term.

This plan requires a silviculture program (planting, pre-commercial thinning) that is 9% above the previous plan, but is 30% reduced from the levels actually completed during the 1997-2000 period.

In summary, we believe that 25-year Management Plan for the Queens-Charlotte License is an ecologically sustainable, economically viable, and socially responsible strategy; that meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management.

BACKGROUND INFORMATION AND PLANNING IMPROVEMENTS

In 1982 J. D. Irving, Limited was assigned management responsibility for the Queens-Charlotte Crown land License (License #6). As a Licensee, the company is required to develop and implement a 25-year Management Plan for the land base that achieves the goals and objectives spelt out by the New Brunswick Department of Natural Resources and Energy (DNRE).

This 2002 Management Plan proposal for the Queens-Charlotte License will be the fifth Management Plan for the land base prepared by J. D. Irving, Limited. A major objective of these plans is to provide a strategy to maximize both the short and long-term wood supply from the License, while achieving many specific non-timber goals for the land base. The Queens-Charlotte License provides sustainable timber allocations for 38 mills in New Brunswick that employ more than 3,000 people.

The March 10, 2000 document: "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management"; outlined the requirements for development and implementation of the 2002 Management Plans. According to the "Vision" document, DNRE has policy goals with respect to:

- public values;
- forest ecosystem maintenance;
- wildlife habitat;
- timber;
- water and aquatic habitat; and
- recreation and aesthetics.

Specific strategies, actions, objectives and standards have been outlined in order to achieve these policy goals. We believe the management strategy put forward in this proposal meets DNRE's goals and objectives for Crown land management.

The 2002-2026 Queens-Charlotte License Management Plan represents a significant improvement over previous plans. By employing new and more accurate information, combined with a broader array of treatment alternatives, and new ecologically based objectives, we believe that we have outlined a management strategy proposal that responsibly balances ecological, economic and social goals and objectives.

Some specific improvements in the 2002 Management Plan include:

- Inclusion of specific biodiversity objectives from an ecological land classification perspective, establishing vegetative community objectives by eco-region.
- A new forest inventory based upon 1993 and 1994 aerial photography for the St. George area has been incorporated.

- An expanded network of Forest Development Survey (FDS) plots which provides a basis for species volume estimates, has been collected between 1996 and 1999.
- An improved, ecologically-based forest stratification process has been implemented.
- A finer resolution of habitat management with respect to old spruce-fir habitat, and old or large succession stages.
- Aesthetic buffer requirements along public highways.
- Utilization of a wider array and more ecologically appropriate treatment alternatives including uneven-aged management, multiple entry harvesting, commercial thinning and modified clear cutting prescriptions.

This management plan has been prepared by J. D. Irving, Limited foresters with significant input and consultation from DNRE regional and technical staff. Concerns from other important stakeholders including sub-licensees, recreational users, community interest groups and the general public have influenced the strategy proposed in this Management Plan. Our strategies and objectives have been developed with considerations and sensitivity form public goals and values.

Approved Management Plans provide the basis for annual "Operating Plans", which are prepared for the License each year. These annual plans are also submitted to DNRE for review and approval. Upon completion of each 5-year management planning period, a performance evaluation, based upon pre-established and mutually agreed to criteria; is undertaken by DNRE, in order to assess operational performance, and the success of management efforts in meeting the forest management objectives for the License.

The 2002-2026 Management Plan for the Queens-Charlotte License provides for all the objectives outlined in the DNRE "Vision" document. A summary comparison of the harvest and silviculture levels for the Queens-Charlotte License is provided in Table 1.

Table 1. Comparison of 1993, 1997 and proposed 2002 Queens-Charlotte License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)	
	Spruce/Fir/ Jack Pine	Hardwood	White Pine Sawlogs	Cedar Highgrade Products	Planting	Pre-commercial Thinning
1993	540,500	177,500	30,000	22,125	1,940	1,430
1997	581,500	220,700	36,300	14,000	2,430	3,550
2002	628,500	278,300	34,400	12,800	3,224	3,305

PUBLIC CONSULTATION AND INPUT

J. D. Irving, Limited has worked actively to solicit public input regarding our forest management, and to improve public consultation processes for many years. This summary is not meant to be an exhaustive analysis of our public consultation efforts, however it outlines some of our more recent efforts. We have utilized numerous vehicles and initiatives in this regard including:

- Participation in, and sponsorship of multi-stakeholder Advisory Committees and processes,
- Public outreach initiatives including open houses, hosting field tours, making presentations to community and special interest groups,
- Active solicitation of public input through advertising in various media,
- Maintenance of an interactive web site that actively solicits questions, queries, and input,
- Production and distribution of informational brochures about our forest management activities and programs,
- Educational initiatives through the school system, interpretation projects, and an educational internet site, and
- Public opinion; and employee surveys.

Some recent examples related to these specific initiatives are further highlighted.

Fundy Model Forest

J. D. Irving, Limited was the original sponsor, is the primary industrial member, and is a very active partner in the Fundy Model Forest. The model forest program is an initiative under Canada's Green Plan. This project began in 1982 when 10 model forests were selected across Canada from a competitive proposal process. The Fundy Model Forest partnership is intended to provide a working model of managing forest resources, involving a broad cross section of multi-stakeholder input, working together, relying on consensus to balance economic, environmental, and social interests.

We have relied upon the Fundy Model Forest process and partnership to provide input to our forest management practices and activities, particularly in the Sussex District. We have utilized our Sussex District land base as a "testing ground" to develop and pilot new

processes, practices, methodologies, and technologies. We have fully participated in the public outreach, public input, and public education initiatives undertaken as part of the Fundy Model Forest program. This has included; research reports, newsletters, field tours, demonstrations, seminars, open houses, surveys, information sessions, and other public input initiatives. Over the past three years, developing and maintaining relationships with local Aboriginal communities has also been a major focus of the Fundy Model Forest program.

Stakeholder Advisory Committees

Based upon our experience in Sussex with the Fundy Model Forest partnership, we decided to establish local Stakeholder Advisory Committees in our other districts; in order to provide opportunities for public and local community input. With these committees, we are attempting to get representation from a broad range of stakeholders with an interest in forest management in the local area. Our objective is that these committees will be informed about, and provide input regarding our forestry practices, our forest management strategies, and other resource issues and values. We also hope that these committee members will be our (two-way) communication link to the broader constituencies they represent. Each of the local Advisory Groups is mandated to review its own membership and representation. The organizational structure, meeting formats and schedules are mutually agreed to within each specific committee. Members on these committees are volunteers, but J. D. Irving, Limited fully supports them from a logistical and facilitation perspective.

Within New Brunswick we have local Stakeholder Advisory Committees in the following areas:

- Chipman/Minto
- Doaktown/Boiestown
- St. George – Charlotte County
- Juniper – Florenceville
- St. Leonard – Grand Falls
- St. Francis/Clair

Those Stakeholder Advisory Groups in areas where we manage Crown Licenses (Chipman/Minto, Doaktown/Boiestown, St. George – Charlotte County and the Fundy Model Forest partnership) have met over the past several months specifically to discuss the 2002 Crownland Management Plan process and our proposals in this regard.

In addition, the company has been involved with, and worked productively with several more focussed and special interest groups in specific locations or on specific issues. Examples in this regard include:

- A Kingston Peninsula and Washedemoak Citizen's Group, concerned about forestry practices in their local areas (Sussex);

- The Ayres Lake Group, interested in recreation and aesthetics near Ayres Lake (Deersdale);
- Numerous local Watershed Groups, established to provide input regarding local watershed management (all our New Brunswick Districts);
- Numerous local Recreational Groups, including Fish & Wildlife Groups, Hikers, Snowmobilers, All Terrain Vechile users, and other outdoor enthusiasts groups (all our Districts);
- Relationship building with some Aboriginal Communities (Chipman, Sussex, Deersdale).
- Meeting with Sub-Licensees to discuss forest management issues and review plans and processes.

J. D. Irving, Limited has also established several scientific input committees. These include:

- J. D. Irving, Limited's "**Forest Research Advisory Committee**" established to provide input and advice regarding the company's forest practices and research initiatives and priorities; particularly with respect to ecological and environmental issues.
- J. D. Irving, Limited's "**Pesticide Advisory Committee**" established to provide input and advice regarding the company's pesticide use and possible alternative strategies.

These scientific committees provide direct communications between J. D. Irving staff and recognized experts in specific fields.

In addition, the company participates in numerous User Groups or Research Committees who also provide a valuable input function to improving our practices and forest management.

Public Outreach Initiatives

J. D. Irving, Limited has been very active participating in different public outreach initiatives. We regularly host field tours for community and special interest groups. We attend many community events including fairs and field days. We accept (many) requests to present information or speak at various community functions, or communicate with community groups. For several years we have been tracking our "Public Group Contacts". In the past many of our district staff have had specific objectives in this regard. On average, J. D. Irving Woodlands staff speak directly to more than 50,000 people about our forest management and on-the-ground practices each year.

Soliciting Public Input Through the Media

The company has been proactive in soliciting public input/questions/queries/comments through the media. These include television advertisement, newspaper advertisement and inserts, distribution of brochures, and use of the Internet. Some specific examples include:

- In 1992, as we prepared a Crown Land Management Plan, we ran a full-page advertisement in the Saturday edition of the provincial newspaper outlining the process and requesting comments (very low response rate).

- In 1998 we inserted an 8-page informational brochure describing our most recent Crown Land Management Plan into the Saturday edition of the provincial newspaper. While this insert requested comments and questions, we had a very low response rate.

- During recent summer seasons, we sponsor the Daily Forest Fire Index Report on a local television station. Our accompanying advertisement provides contact information.

- Our company maintains two web sites, one that is targeted towards students and educators (www.ifdn.com); as well as a corporate web site (www.jdirving.com). Both these web sites request and welcome input or questions, and provide direct easy e-mail access. We get some excellent input and questions from these sites.

Production and Distribution of Informational Brochures

The company has produced and distributed many informational brochures that cover all aspects of forest management and the forest products industry. These brochures are readily available and are openly provided to anyone requesting information about the company or our practices.

Educational Initiatives

The company has undertaken and has been directly responsible for several outstanding and award winning educational initiatives. **The Forest Discovery Box** was an outcome of a partnership with the New Brunswick Department of Education and J. D. Irving, Limited to foster a greater understanding of the region's forest resource. The program was meant to be credible, contemporary, fun, bilingual, and cross-curriculum. Three New Brunswick teachers and J. D. Irving staff developed the Discovery Box. It features six videos, hands-on samples, as well as numerous teaching aids and other resource materials. A Forest Discovery Box was delivered to every school in New Brunswick. Based upon the surveyed results of this initiative, a forestry education web site was developed by the company. This web site is being continuously updated with additional educational material. A supporting newsletter for teachers is also periodically produced.

Parks And Interpretive Sites

The company has developed several parks and interpretive areas with a specific educational and communication focus. These include:

- **The Irving Nature Park**, in Saint John;
- **La Dune de Bouctouche**, in Bouctouche, New Brunswick; and
- **The New France Historical Site** near Weymouth, Nova Scotia.

Each of these sites is educational in nature. The Irving Nature Park and La Dune de Bouctouche is fully staffed with trained professional ecologists. These sites and our staff at them are intimately involved with thousands of visitors each year. They also serve as important "gateways" for public input to the company and our forest practices.

In addition to these interpretation areas, the company maintains numerous other recreational developments that also attract public use and public input.

Public Opinion Surveys

J. D. Irving, Limited regularly participates in public opinion surveys. These surveys are professionally designed, and carefully done by third party firms in order to provide public opinion information on current topical issues. The company also undertakes employee surveys on an annual basis.

These briefly highlighted initiatives provide an overview of J. D. Irving, Limited's public consultation processes and initiatives.

LANDBASE DESCRIPTION

The Queens-Charlotte License (License #6) is the largest Crown License in New Brunswick, encompassing approximately 567,587 hectares. It is located within seven counties (Northumberland, Kent, York, Sunbury, Westmorland, Queens and Charlotte), and two DNRE Regions (2 and 3) as shown in Figure 1.

Of the total license area, approximately 88% is productive forestland (505,219 hectares). The remaining 12% is composed of water and wetlands (8%), roads and other rights-of-ways (2%), or other non-forest land (2%), as shown in Figure 2.

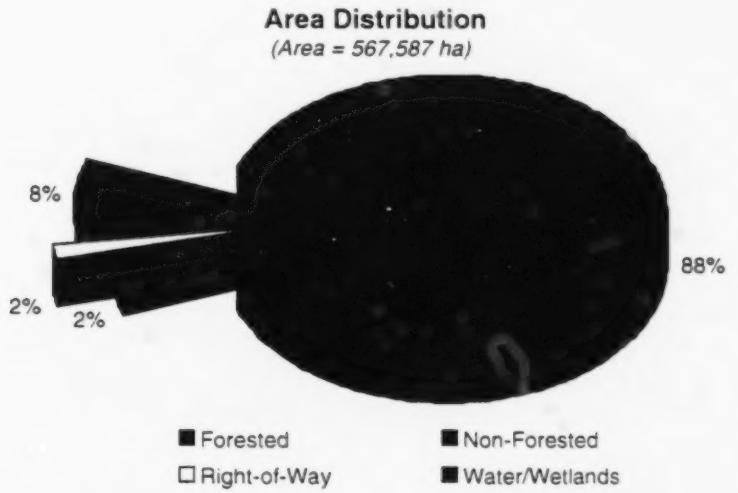

Figure 2: Summary of total area by land classification on the Queens-Charlotte License.

The forest cover type distribution of the productive forest within the Queens-Charlotte License is summarized in Figure 3. Approximately 66% of the productive forest is dominated by softwood cover types, while 19% is hardwood, and 15% is mixed wood types.

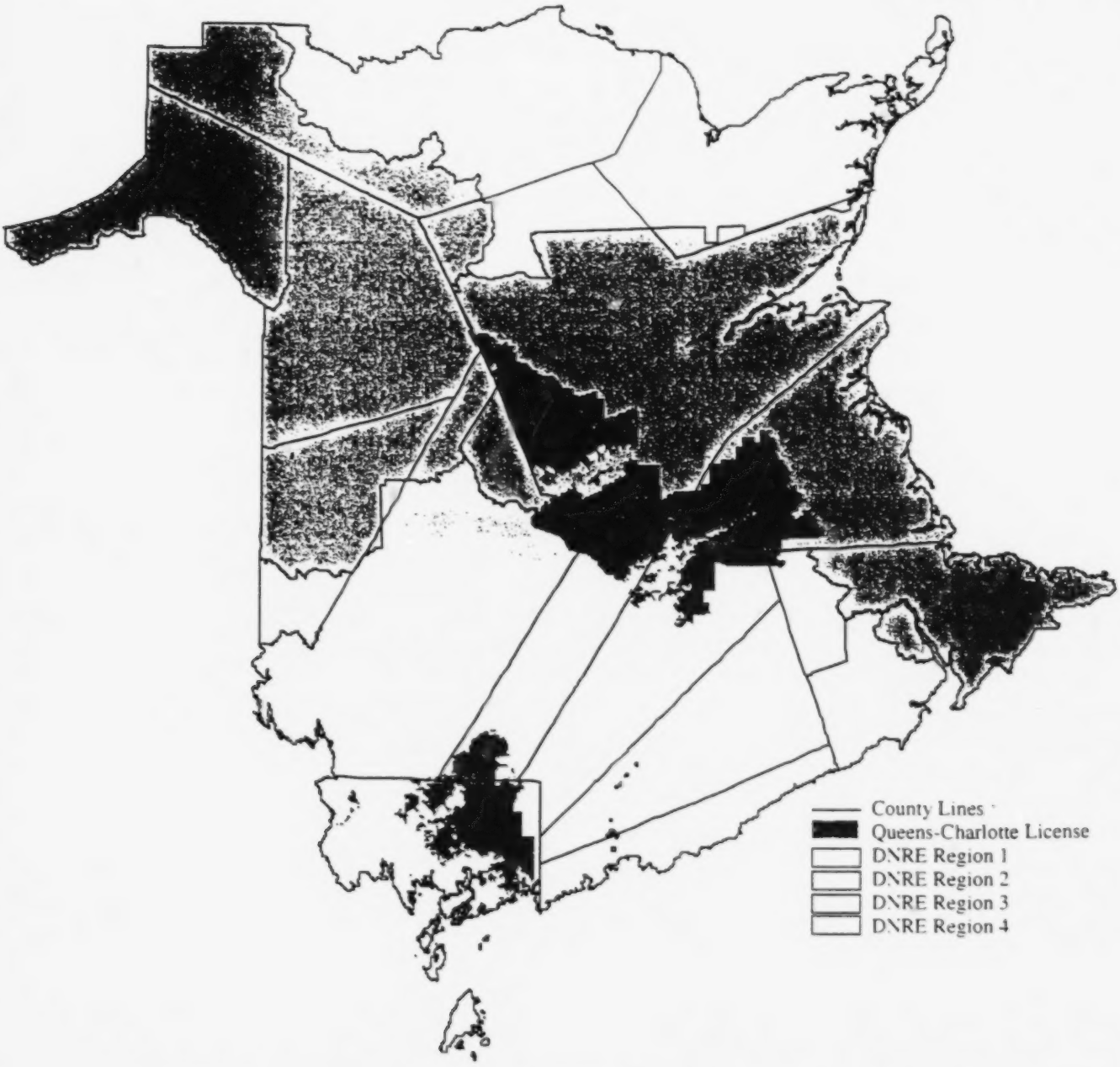

Figure 1: The Queens-Charlotte License highlighted by DNRE regions and provincial county lines

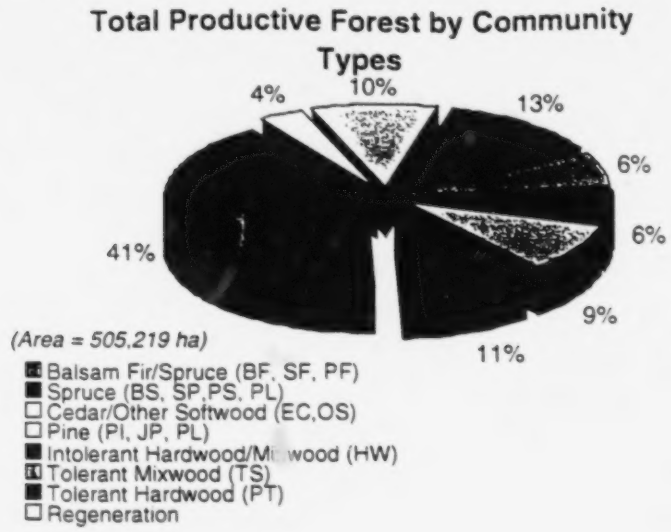

Figure 3: Forest community distribution for the productive forest.

More than 58,000 hectares have been planted since 1977. In addition, more than 55,000 hectares of naturally regenerated stands have been pre-commercially thinned over the past 20 years.

The net merchantable growing stock on the Queens-Charlotte License is presently estimated to be approximately 47 million cubic meters. Softwood species, dominated by spruce, fir, and jack pine, make up 33 million cubic meters; while hardwoods comprise approximately 14 million cubic meters. Figure 4 depicts the growing stock composition, by species on the License.

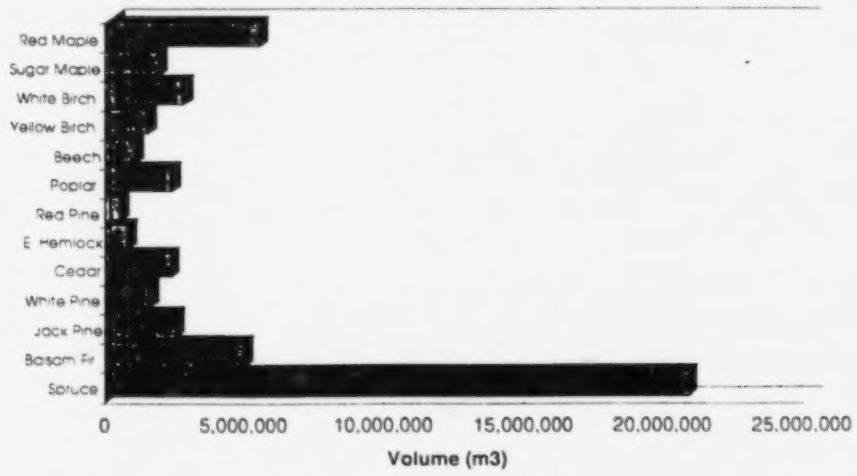

Figure 4: Merchantable inventory by species reported in cubic meters.

The age-class distribution of the Queens-Charlotte License could be generally characterized as having a preponderance of area in an over mature condition, and a large area in regenerating and immature stages. This unbalanced age-class structure provides a distinct management challenge, and highlights the importance of maintaining the productivity of intensive silvicultural investments such as tree planting, pre-commercial thinning, and other stand tending treatments. Figure 5 shows the area by broad forest community type within each age class.

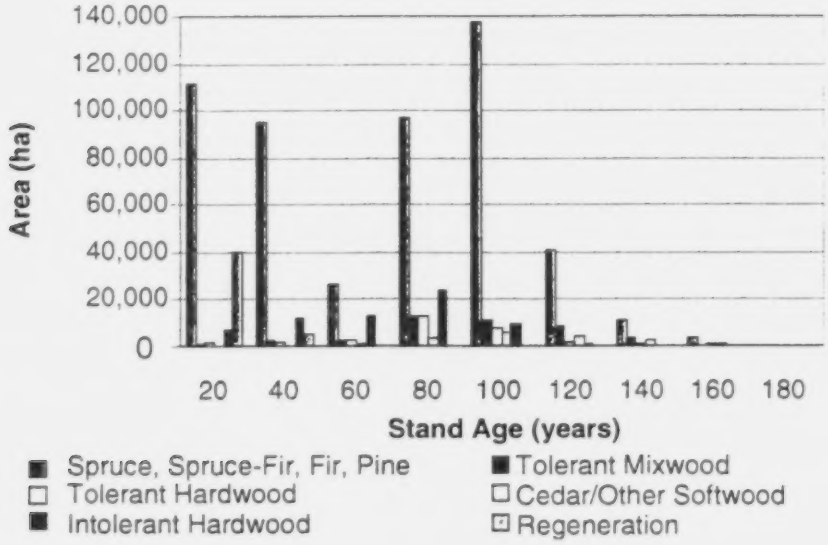

Figure 5: Age-class structure by forest community grouping on the Queens-Charlotte License

The Queens-Charlotte License lies within five eco-regions. The majority of the land base occurs within the Continental Lowlands (Eco-region 5) and Eastern Lowlands (Eco-region 6) encompassing approximately 469,200 hectares or 83% of the License. Table 2 outlines the area distribution of forested land within each eco-region. Figure 6 depicts the actual boundaries of each eco-region within the Queens-Charlotte License.

Table 2. Land distribution according to eco-regions.

Eco-Region Name	Eco-Region Number	Area (ha)	Percent of Land base (%)
Highlands	1	3,530	1
Southern Uplands	3	33,823	6
Fundy Coastal	4	25,461	5
Continental Lowlands	5	269,156	47
Eastern Lowlands	6	199,929	35
Grand Lake	7	35,699	6

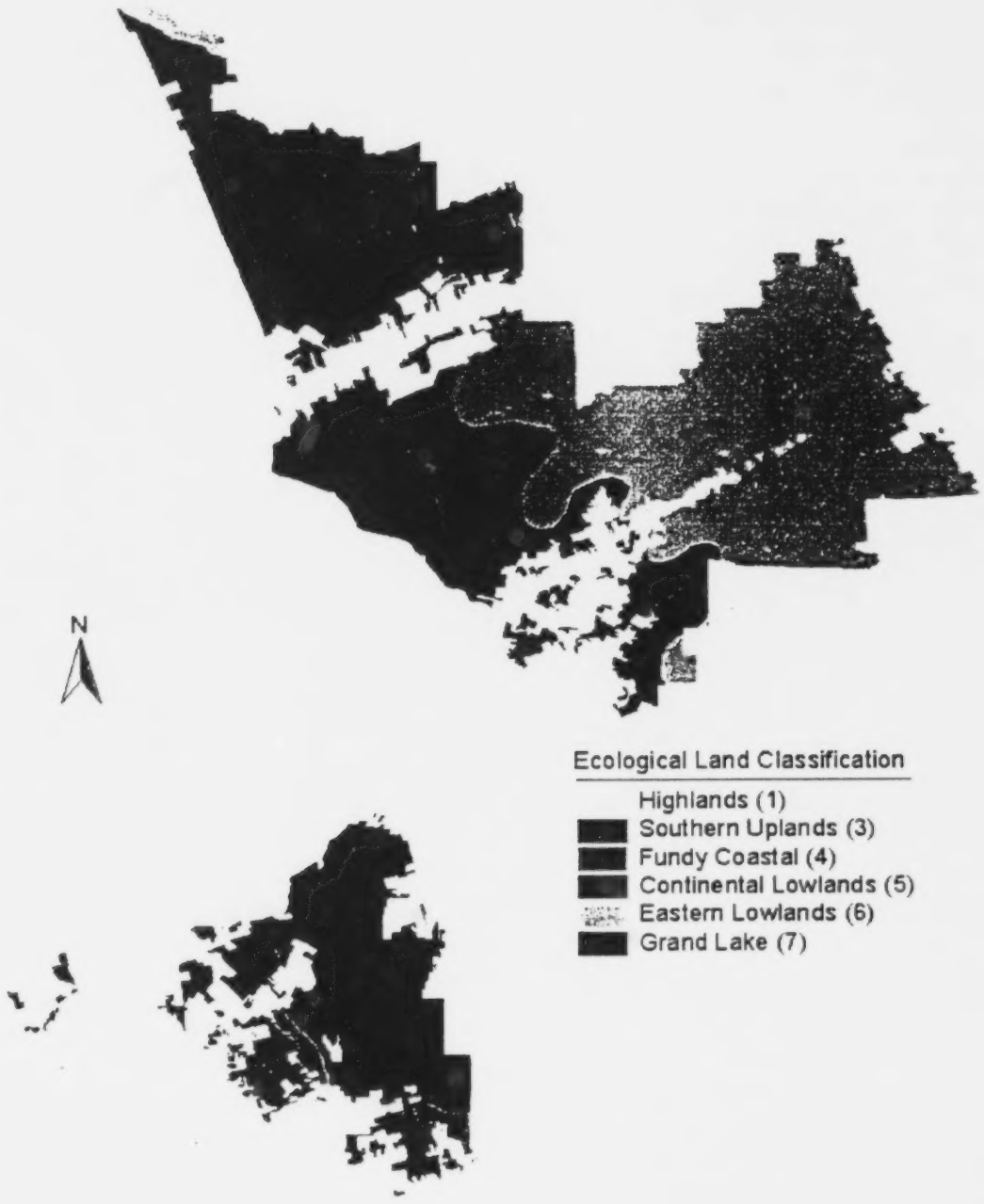

Figure 6: Eco-regions within the Queens-Charlotte License.

The 6 eco-regions, which were defined under the Ecological Land Classification System, are of particular importance in this new management plan. DNRE has established several specific forest community, wildlife habitat, and biodiversity objectives for each eco-region.

Within the Queens-Charlotte License, we have recognized several separate and distinct "Special Management" zones, each of which has different primary management objectives. These zones include two "Protected Areas" (Kennedy Lakes and Canaan Bog) which cover approximately 22,653 hectares; 17,693 hectares are "Unique Areas" and "Reserves"; Deer Wintering Area Management Units (DWAMU's) compose 38,767 hectares; "Old Spruce-Fir" (OSFH) blocks cover 25,218 hectares; and 47,750 hectares are within watercourse buffer zones. The "General Forest Zone" covers the remaining 415,524 hectares. The non-timber zones are not mutually exclusive (i.e. there may be DWAMU's in a proposed protected area), however we have reported the hectares according to the highest reservation category priority. Figure 7 and Table 3 summarizes the productive area and proportion of the total license area within each zone.

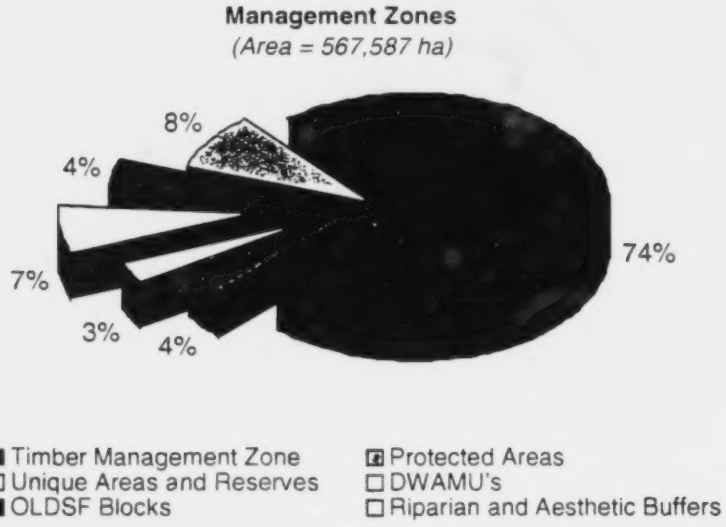

Figure 7: Summary of primary management zones within the Queens-Charlotte License.

The actual location of these different zones is shown on the map in Figure 8. Distinct management strategies have been developed for each management zone, which are based on separate and specific objectives, prescriptions and practices which are deemed appropriate for each zone. The objectives and the strategy will be more fully discussed later within this document.

More than 114,000 individual forest stands make up the productive forest in the Queens-Charlotte License. For classification, monitoring and forecasting purposes, these stands

have been stratified into 69 separate strata based upon vegetative forest communities and developmental patterns. The algorithm used to determine the forest community grouping is summarized in Figure 9.

Table 3. Area distribution of special management zones on the Queens-Charlotte License.

	Total Forest							Productive Forest
	Protected Areas (ha)	Unique Areas (ha)	DWAMU's (ha)	OLDSF Blocks (ha)	Buffers (ha)	Total Area (Not Mutually Exclusive) (ha)	Total Area (Mutually Exclusive) (ha)	Total Area (Mutually Exclusive) (ha)
Protected Areas	22,653	7,273	275	3,953	2,409	22,653	22,653	19,200
Unique Areas and Reserves	7,273	24,966	660	3,434	4,358	24,966	17,693	9,070
DWAMU's	275	3,434	39,682	9,186	8,884	39,682	38,767	36,127
OLDSF Blocks	39,530	3,666	9,186	45,179	6,520	45,179	25,218	28,389
Riparian and Aesthetic Buffers	2,409	4,360	8,884	6,520	65,463	65,463	47,750	34,870
Total							152,081	127,656

An area summary and brief description of the strata defined for the Queens-Charlotte License is provided in Appendix III.

The forest stratification, combined with site information (eco-region/eco-district, site productivity) and silvicultural or harvesting interventions provide the basis for growth, yield and future development patterns.

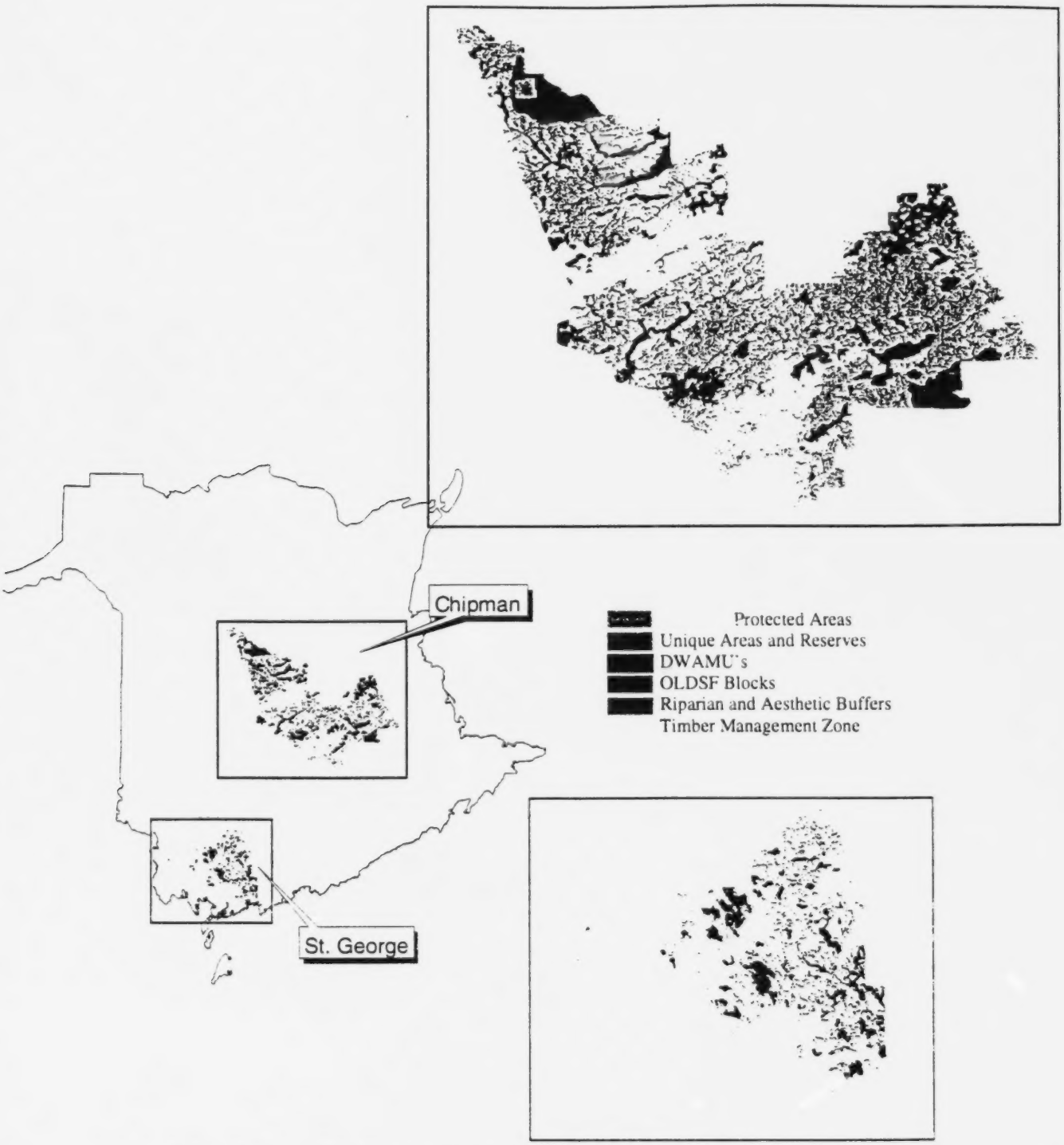

Figure 8: The Queens-Charlotte License by primary management zones.

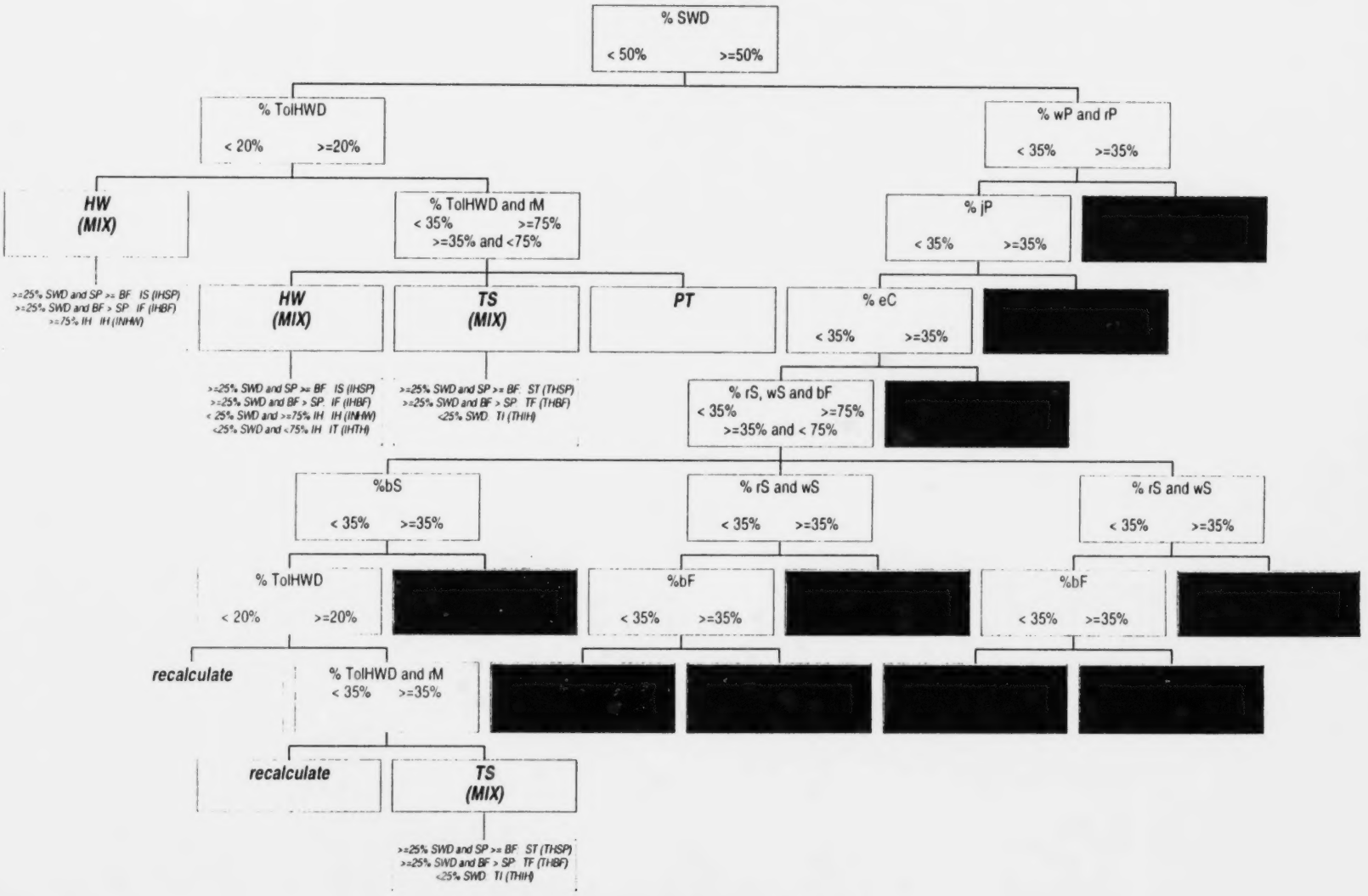

Figure 9. Forest community cover type key.

GROWTH AND YIELD

Each of the 69 forest strata on the Queens-Charlotte License is assumed to follow a specific growth, yield and development pattern. These patterns have been developed from ground plot data (including forest development survey (FDS) plots and permanent sample plots (PSP)). Forest strata development is also affected by factors such as: climate, drainage, site productivity, topography, insects, disease, competition, silvicultural and/or harvesting or other interventions, genetic quality, as well as vegetative composition. Each of these factors significantly affects growth and yield development, which in turn affects product and/or habitat suitability and quality. Growth and yield curves, habitat "windows" and development patterns have been defined for each forest strata, based upon the major expected influencing factors, and silvicultural or harvesting interventions.

A summary of the expected peak yield, age and habitat suitability for each of the strata is outlined in Appendix IV.

A brief description of the photo interpretation, forest stratification process, harvest response matrix, and verification of the yield curve construction process is provided in Appendix V. Appendix VI also includes a visual representation of each yield curve.

HARVEST AND SILVICULTURE PRESCRIPTIONS

A variety of harvest and silvicultural prescriptions will be utilized on the Queens-Charlotte License in order to achieve the management objectives for the land base. Specific prescription and treatment scheduling will depend upon the unique stand level conditions and the stand level, landscape level, product quality and flow objectives. In addition, any treatments or strategies must be in full compliance with both DNRE and company policies, and our "Best Management Practices" (BMP's). Follow up monitoring and reporting will be undertaken, as required, to ensure that silviculture and regeneration objectives have been achieved.

It is most important to note that every silvicultural and harvest prescription will be developed specifically for, and adjusted to fit the specific site conditions. However, for management planning and landscape level analysis purposes; prescriptions, strategies and schedules have been modeled and forecast on a more general strata basis.

For the 2002-2026 Queens-Charlotte License Management Plan we are planning to utilize a suite of nine general harvest prescriptions. These include:

- variable retention clear cutting
- over story removal,
- patch cutting,
- partial cutting,
- shelterwood and multiple pass harvesting,
- commercial thinning,
- salvage harvests,
- single tree selection, and
- group selection.

Harvest Treatments

Variable Retention Clear-cutting:

Variable retention harvest prescriptions remove most of the merchantable stems of all species in a single treatment. This prescription is generally applied to even-aged mature or over mature stands, leading to even-aged regeneration through natural processes or tree planting. In some variable retention situations, a "Seed Tree" harvest prescription will be utilized. Within the harvested area, attention is paid to maintain sufficient vertical structure and biodiversity by leaving residual trees, clumps or islands of native trees and advanced natural regeneration. This variable retention is considered to be important for wildlife and to maintain natural disturbance and biodiversity patterns. We have assumed that approximately 3% of the pretreatment volume will remain as residual stand components following this prescription.

Over story Removal:

Over story removal harvest prescriptions remove most of merchantable stems of all species in a single treatment entry. This even-aged management prescription pays particular attention to the protection and release of well established regeneration in the under story (*generally greater than two meters in height*). Full planting is not required following an over story removal harvest, however a very minor level of fill planting of trails or small un-regenerated patches within the block may be prescribed. Maintenance of sufficient vertical structure is also a consideration in over story removal prescriptions, and we assume that 3% of the pretreatment volume will remain as a residual component of the new stand.

Patch Cutting:

Patch cut or strip cut prescriptions are even-aged management, similar to clear-cuts or over story removals, however the opening size is much smaller; typically less than two hectares in size. Approximately 30% to 40% of the stand area (and volume) will be harvested during the first entry, (*modeled as 33% removal*). Patch Cutting is even-aged management, and the re-entry period between treatments is typically only 5 to 15-years. In some Patch Cutting prescriptions (Patch #2), the remaining two thirds of the harvest block entry will be removed 5 to 15-years later (*modeled as 10 years re-entry*). In other Patch Cutting prescriptions (Patch #3); there will be two subsequent entries, separated by 10 years, removing 33% of the stand area each entry. This prescription is often utilized to address adjacency concerns, or to promote natural regeneration.

Partial Cutting:

Partial cutting targets harvesting of specific species or species groups (*i.e. balsam fir or spruce/fir*) while other species are generally left standing. Partial cuts may be prescribed when a particular species is overly predominant or is becoming decadent well ahead of most of the other species in the stand. Frequently, however, partial cuts are prescribed with an intention that the stand will be operated again in the near future. A partial cut prescription is usually associated with an even-aged management strategy. The partial cutting prescription is not ideal or preferred; however, it may be utilized on occasion, at the operating plan level, often associated with harvesting spruce or fir and leaving residual stands of primarily hardwood over stories.

Shelterwood and Multiple Pass Harvesting:

The shelterwood and multiple pass treatments are often practiced in stands with a goal of promoting natural regeneration, salvaging morality or eliciting growth response in the residual over story. In most situations this prescription is even-aged management; however, in some cases the long-term objective may be to create all aged stands. In the majority of shelterwood or multiple-pass harvest prescriptions, up to 40% of the standing volume is removed in the first pass (*modeled as 33% removals*), focussing on the shorter lived species and lower quality or less vigorous trees. The second entry is normally delayed by 5 to 10

years, depending upon the specific stand conditions and objectives. There are some variations on the standard shelterwood that may be prescribed in specific circumstances including irregular shelterwood and some group selection methods.

Commercial Thinning:

Commercial thinning is generally prescribed in planted stands or previously pre-commercially thinned areas. The primary objective of this treatment is to remove a portion of the trees, usually focusing on lower quality stems, in order to allow the remaining trees to continue growing vigorously. This prescription generally removes 20% to 40% of the volume in the first treatment *(modeled as 30% removal)*. Some stands, especially those that have been planted, may undergo two or three commercial thinnings. Depending upon the species, density and site productivity, commercial thinnings may be prescribed in stands varying from 20 to 50 years old. Once a stand has been commercially thinned, it is "locked out" from harvest eligibility for the next 10 year period (*i.e. a stand commercially thinned at age 30, is not eligible for further harvest activity until at least age 40*).

Salvage Harvests:

Salvage harvesting is usually only prescribed in specific situations to salvage recent or imminent mortality, or small-scale wind throw, in stands that would otherwise not be scheduled for harvesting in the very near future. These prescriptions would most often be utilized along roadsides, block edges, in some riparian zones or other special management zones (*i.e. unique areas*). These prescriptions are not blocked in the Management Plan; however, they will be utilized in specific instances as necessary.

Single Tree Selection:

Single tree selection harvest is usually classical uneven-aged management. Ideally this prescription targets tolerant hardwood, tolerant mixed wood, or cedar dominated stands. It may also be used in stands with significant components of Red Spruce, White Pine or Hemlock. In addition, non-timber primary management objectives in riparian zones or in recreational and aesthetically important areas may result in a single tree selection treatment being utilized.

Typically, uneven aged management may remove 20 to 40% of the stand volume each entry (*modeled as 33%*), depending upon the specific stand condition. Each entry is normally separated by 15 to 30 years (*modeled as 20 year re-entries*). The objective of the single tree selection treatment is generally to develop a full range of age and diameter classes in the stand; as well as to provide a suitable diversity of tree species at all times.

Group Selection:

The objective of the group selection prescription is to create and maintain an uneven-aged stand condition, and it is usually directed to sites and species compositions that will be

managed on a single tree selection basis in the long term. The group selection treatment often targets stands where the long-term objective is to promote a different species composition than is presently occurring on the site. Some examples in this regard include:

- promoting Yellow Birch over Beech,
- promoting spruces over Balsam Fir, and
- introducing Red Spruce or White Pine into the stand composition.

Ideally the opening size in-group selections is less than one hectare, and in many specific circumstances it is much smaller. Individual trees may be left standing in the opening, particularly if they contribute to the long term management objectives for the stand (i.e. pole size hardwoods or saplings of desired species). The entry period after the group selection prescriptions is generally 10 to 30 years (*modeled as 20-year re-entries*). The earlier re-entry prescriptions will be used in some situations to accelerate transition to uneven-aged management. Normally these prescriptions remove 20% to 40% of the merchantable standing volume in a single entry (*modeled as 33% removal in the first entry*), depending upon the specific stand conditions. In some situations an entire stand may be operated in one treatment using a combination of individual tree, and group selection prescriptions. Group selection prescriptions are included with single tree selection prescriptions for modeling purposes.

A more technical description of the harvest prescriptions planned for use within each specific strata is provided in Appendix VII.

A summary of the harvest prescription eligibility for each strata is provided in Table 4 (*a more descriptive summary can be found in Appendix VIII*). It is very important to note, that every silvicultural and harvest prescription will be developed specifically for and adjusted to fit the specific site conditions. However, for management planning and landscape level analysis purposes; prescriptions, strategies and schedules will be modeled and forecast on a more general strata basis. In addition, any treatments or strategies must be in full compliance with both DNRE and company policies, and our "Best Management Practices" (BMP's).

Table 4. Harvest prescription eligibility for the Queens-Charlotte License.

Forest Community Type	Harvest Prescription						
	Variable Retention	Overstory Removal	Patch #2	Shelterwood	Single Tree / Group Selection	Patch#3	Commercial Thinning
BS (Black Spruce, High Crown Closure)	x			x			
BS (Black Spruce, Low Crown Closure)	x	x		x			
EC(Cedar, High Crown Closure)	x	x	x	x	x	x	
EC(Cedar, Low Crown Closure)	x		x	x	x	x	
HW (intolerant Hardwood)	x	x		x		x	
HW(Spruce-Tolerant Hardwood)	x	x		x		x	
JP(Jack Pine , High Crown Closure)	x	x		x			x
JP(Jack Pine, Low Crown Closure)	x	x		x			
OS(Other Softwood)	x		x		x	x	
PF (Balsam Fir)	x	x		x	x	x	
PI(Pine)	x	x	x	x	x	x	x
PS(Pure Spruce, High Crown Closure)	x	x	x	x	x	x	
PS(Pure Spruce, Low Crown Closure)	x	x	x	x		x	
PT (Pure Tolerant Hardwood)	x	x	x		x	x	
SF(Spruce-Fir)	x	x	x	x	x	x	
SP(Spruce-Tolerant Hardwood)	x	x	x	x		x	
SP(Spruce-Intolerant Hardwood)	x	x	x	x		x	
TS (Tolerant Hardwood/Softwood)	x	x	x	x	x	x	
TS (Intolerant-Tolerant Hardwood)	x	x		x	x	x	

Intensive Silviculture Treatments

Several intensive silvicultural treatments provide an opportunity to increase both the short and long-term yield of desired timber products as well as meeting some specific habitat objectives.

We are interested in maximizing the long-term yield of solid wood products from the Queens-Charlotte License in an environmentally responsible and sustainable manner. Several cost-effective silviculture treatments will be utilized in order to help achieve this objective. Some of the on-the-ground silviculture treatments that will be undertaken in this regard include:

- treatments related to tree planting,
- pre-commercial thinning,

- herbicide release, and
- commercial thinning.

Tree Planting:

Areas that have been clear-cut may be eligible for, and benefit from, planting if the area is not sufficiently stocked with natural regeneration. Depending upon the specific site conditions, the following species may be planted:

- Black Spruce,
- White Spruce,
- Red Spruce,
- Norway Spruce,
- Jack Pine,
- White Pine, or
- Red Pine.

In addition, minor amounts of species like Eastern White Cedar, Red Oak or Basket Willow may also be planted for site rehabilitation or wildlife reasons.

On most harvested areas that are planted, a combination of species or mixed species are actually employed. Careful consideration is made in each prescription to plant a species that is appropriate for each specific site. When a harvested area is prescribed for planting, care is taken to protect the healthy advanced regeneration that already occupies the site. We avoid planting a tree within one meter of any vigorous natural regeneration. During scarification, care is also taken to protect patches of regeneration and vigorous individual trees.

The vast majority of our planting prescriptions are "full planting" where approximately 2,200 trees per hectare are planted and the area is usually first site prepared by scarification. On occasion however, an area may be "fill planted" where the land is not scarified and substantially less trees are planted due to the advanced regeneration that is present. "Under planting" prescriptions, where trees are planted under a mature over story, may also be utilized (i.e. White Pine, Red Spruce, Cedar, Red Oak).

A "Tree Improvement" program is in place to improve the genetic quality and adaptability of the planting stock. This work has been well underway for almost 20 years, focusing on the spruces and pines that we commonly plant. The future yield improvements that we expect as a result of this program have been scheduled and incorporated into our growth and yield curves utilized in this Management Plan. The level of improvement and availability of improved planting stock is summarized in Table 5.

Table 5. Summary of yield increases as a result of tree improvement for the Queens-Charlotte License.

Species	Average Yield Improvement	Year of Planting that this Increased Yield Starts
White Spruce	5%	1992
	10%	1997
	20%	2007
Black Spruce	5%	1992
	10%	1997
	15%	2002
	20%	2007
Red Spruce	5%	2002
	10%	2007
Norway Spruce	10%	2007
Jack Pine	5%	1992
	10%	1997
	15%	2002
	20%	2007

Several other silvicultural operations are often carried out in conjunction with tree planting prescriptions. These include:

- site preparation,
- herbicide release,
- manual cleaning,
- pre-commercial thinning,
- commercial thinning, and
- insect control.

All of these treatments, including tree planting, have very detailed and specific policies and procedures that must be complied with. The full suite of treatments is not automatically prescribed for all planting situations. Each individual action is only undertaken after careful consideration of the costs, risks, and benefits and in full conformance with DNRE policies and procedures.

Historically, the species that have been most often planted include black spruce, Jack Pine and white spruce. To date, more than 58,000 hectares have been planted on the Queens-Charlotte License.

The following tables (Table 6 and Table 7) summarize the expected yields forecasted for our planted stands.

Table 6. Pre 1982 plantation yield characteristics.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Black Spruce	135	0.08	193	0.11	231	0.15
Other Spruce	155	0.11	193	0.15	232	0.20
Jack Pine	152	0.09	188	0.13	211	0.17

Table 7. Post 1982 plantation yield characteristics on different site classes (without tree improvement).

	Age 35		Age 45		Age 55	
Stratum	m3/ha	m3/tree	m3/ha	m3/tree	m3/ha	m3/tree
Site Class 1						
Spruce	152	0.10	207	0.14	252	0.19
Jack Pine	215	0.15	268	0.21	312	0.26
Site Class 2						
Spruce	121	0.08	173	0.11	220	0.15
Jack Pine	181	0.11	232	0.16	275	0.21
Site Class 3						
Spruce	85	0.06	129	0.09	178	0.12
Jack Pine	136	0.09	186	0.12	228	0.16

Pre-commercial Thinning:

Naturally regenerated areas may be eligible for, and receive a pre-commercial thinning treatment if there is both a high stocking (>60%) and a high density (>4,000 stems per hectare) of commercial tree species. This work is usually done using manual crews with mechanized brush saws. The actual scheduling, target density and species composition of these treatments are prescribed on a site by site basis. Generally, pre-commercial thinning is focused on naturally regenerated areas 10 to 20 years post harvest with a post treatment target density of 2,500 to 3,000 stems per hectare.

In most situations these treatments result in softwood dominated stands; however, these prescriptions can also improve the quality and composition of mixed wood and hardwood stands. The species priority is established for each specific treatment area, however, species such as White Pine, spruce, Yellow Birch and Sugar Maple are most often favored.

The objective of a pre-commercial thinning prescription is to treat fully stocked regenerating stands in order to avoid stagnation and to release 2,500 to 3,000 future crop trees by providing them with sufficient space, sunlight, water, and nutrients in order to continue to grow vigorously. High quality dominant trees of desired species tend to be favored in this treatment. Site by site adjustments to the species priority provides an additional opportunity to "steer" the stand to the most desired or appropriate species composition.

On the Queens-Charlotte License, a pre-commercial thinning program directed to developing softwood, mixed wood, and hardwood stands will continue to be an intricate component of the management strategy. Many of the stands that have been pre-commercially thinned will be subsequently eligible for, and treated with a commercial thinning prescription. The following tables (Tables 8 and Table 9) show the projected yield of pre-commercially thinned stands.

Table 8. Yield characteristics of pre 1985 pre-commercially thinned natural stands.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Spruce	116	0.09	159	0.11	202	0.14
Spruce-Fir	97	0.06	150	0.08	191	0.10
Fir-Spruce	83	0.07	130	0.10	178	0.12

Table 9. Yield characteristics of post 1985 pre-commercially thinned natural stands.

	Age 35		Age 45		Age 55	
Stratum	m^3/ha	m^3/tree	m^3/ha	m^3/tree	m^3/ha	m^3/tree
Site 1	123	0.08	181	0.12	231	0.16
Site 2	91	0.05	144	0.08	194	0.11
Site 3	60	0.03	104	0.05	146	0.08

Herbicide Release:

The use of herbicides is a silvicultural tool that is very carefully scrutinized prior to its use. In some situations, however, competition to young regeneration from grasses, raspberries or other brush species necessitates this treatment. Herbicide release is often prescribed to release young-planted areas 1 to 5-years after establishment. Only very rarely is the treatment used for site preparation or to release existing natural regeneration. Over the past three years the herbicide release treatment level on the Queens-Charlotte License has averaged approximately 3,000 hectares per year. The herbicide product utilized by the land manager has been "Vision" (glyphosate); however, there have been trials using "Release"

(tryclopyr). These treatments are most often applied using rotary wing aircraft, however, some ground applications may be utilized.

We are actively working to minimize our use of pesticides. We have undertaken and participated in research and comparative trials to:

- reduce application rates,
- improve the application technology,
- use alternative methods, and
- forego treatments.

When necessary, the herbicide release treatment is undertaken using carefully trained, licensed staff, and state of the art technology and equipment.

Commercial Thinning:

The commercial thinning prescription has already been described in the discussion about harvesting treatments utilized on the License. It is important to reiterate, however, that this prescription is really a silvicultural investment (and cost) that is focused on releasing and maintaining the future crop trees in a vigorously growing condition.

The stands that are most often scheduled to receive a commercial thinning treatment are those that have been previously planted or pre-commercially thinned. For management planning purposes, we are not planning to do commercial thinning in Jack Pine plantations. The following tables (Table 10 and Table 11) show the yield projections for the commercially thinned stands.

Table 10. Commercial thinning yield characteristics of pre-1982 plantations or pre-1985 pre-commercial thinning.

Stratum	Thinning Entry	Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*
Plantations				
Spruce	1	46	0.09	30
Black Spruce	1	41	0.07	30
Pre-commercially Thinned				
Spruce	1	56	0.11	40
Spruce-Fir	1	51	0.09	40
Fir-Spruce	1	50	0.10	40

* Operable age refers to the earliest age at which the commercial thinning can occur

Table 11. Commercial thinning yield characteristics of post-1982 plantations and post 1985 pre-commercial thinning.

Stratum	Thinning Entry	Site 1			Site 2		
		Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*	Volume Extracted (m^3/ha)	Piece Size (m^3/tree)	Operable Age*
Plantations							
Black Spruce	1	37	0.07	30	37	0.07	35
Spruce (White or Norway)	1	49	0.08	25	48	0.08	30
Spruce (White or Norway) Pre-commercially Thinned	2	52	0.12	40	52	0.11	45
Spruce-Fir	1	50	0.10	35	43	0.08	40

* Operable age refers to the earliest age at which the commercial thinning can occur.

The actual suite of harvesting and silvicultural treatments that may be prescribed in a particular forest zone or stand will depend upon the management objectives for that zone and the specific condition of the stand. A generalized broad landscape level strategy is proposed for our Management Plan; however, at the Operating Plan level, detailed block and stand specific prescriptions will be planned and implemented.

SPECIAL MANAGEMENT ZONES

As previously noted, 26% of the Queens-Charlotte License productive area lies in specifically located "Special Management Zones" where timber production is not the primary management objective. These include:

- Protected Areas (4%),
- Unique Areas and Reserves (3%),
- Deer Wintering Area Management Units (DWAMU) (7%),
- Old Spruce-Fir Habitat blocks (OSFH) (4%), and
- Watercourse buffer zones (8%).

It is also important to note that in addition to these spatially defined zones, it is required that many other non-timber objectives be met within the "General Forest Zone". Some of these objectives include:

- old and large succession stages;
- vegetation community levels;
- aesthetic buffers;
- recreational use and access, opening size and adjacency; and
- structural and biodiversity BMP's.

We have developed and are proposing a specific management strategy and an annual allowable harvest level for each of the spatially defined "Special Management Zones".

Protected Areas

DNRE has outlined two protected areas that occur (partially) on the Queens-Charlotte License. These include:

- Kennedy Lakes, and
- Canaan Bog

Figure 10 depicts the location of these areas within the Queens-Charlotte License. The Kennedy Lakes proposed protected area consists of a "Core Reserve" area that is immediately protected, plus a "Future Reserve" area where the level of harvesting outlined in the previous 1997 Management Plan would be permitted only until 2012.

We have completed an analysis of these newly protected areas, and we have determined that approximately 22,653 hectares of Queens-Charlotte License is included within these protected areas; 93% within the "Core Reserve" area, and 7% within the "Future Reserve" area. We have also over laid these reserve areas onto our 1997 blocked Management Plan in order to estimate the 25 year impact upon the previous plan. This analysis indicates that the Core Reserve Area has an immediate impact of reducing the AAC on the Queens-Charlotte License by 15,631 m^3 per year (8,243 m^3/yr for spruce/fir/Jack Pine; 6,170 m^3/yr for hardwood and 608 m^3/yr for other softwood (Table 12).

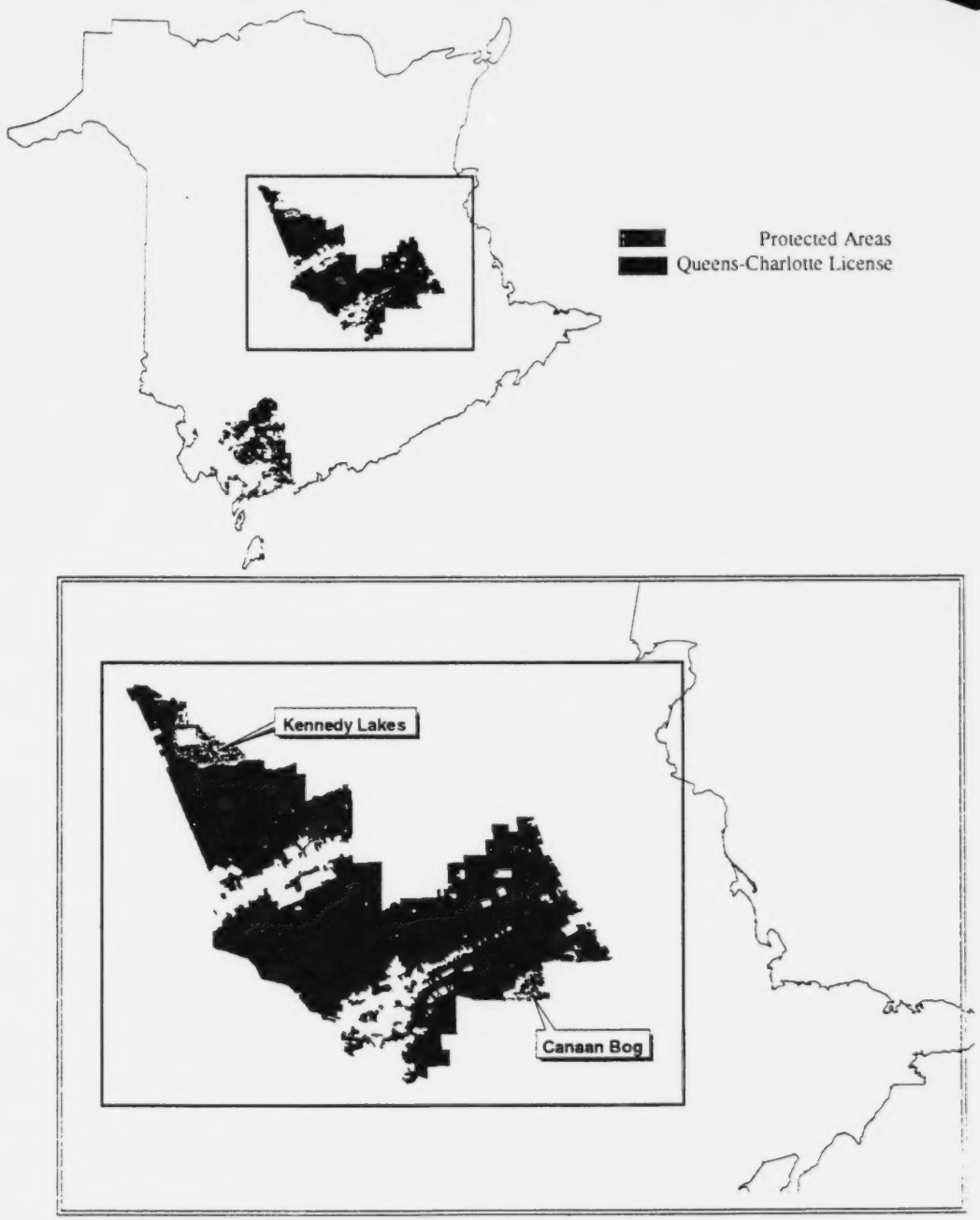

Figure 10: The protected areas within the Queens-Charlotte License.

Table 12. Volume "locked out" per species within the "Core and Future Reserve" areas, according to the 1997 Management Plan.

	SP/BF/JP m^3	OS m^3	WP m^3	HW m^3	Total Volume
Core	206,065	15,200	15,250	154,242	390,757
Future	33,659	965	653	9,314	44,591
Total	239,724	16,165	15,903	163,556	435,348

After reviewing and revising the scheduled but un-harvested 1997 Management Plan blocks within the Kennedy Lakes "Future Reserves" area; we determined that approximately 16,400 m^3 of spruce/fir/jack pine could realistically be harvested from that zone over the next 5 years. These results are summarized in Table 13.

Table 13. Planned harvest volume availability for the next 5 years (after operational net downs) from the "Future Reserve" area of the Kennedy Lakes protected area on the Queens-Charlotte License.

Period	Spruce/Fir/ Jack Pine m^3/year	Hardwood m^3/year	White Pine Sawlogs m^3/year	Cedar Saw Material m^3/year
2002-2006	3,000	2,300	200	100

Unique Areas and Reserves

We have designated 50 Unique Areas on the Queens-Charlotte License. These areas are considered "unique" due to a biological, geological, geographical, cultural or other recreational characteristic or feature of the area. Approximately 25 hectares of "Reserves", previously designated by DNRE, are included within the "Unique Area" land base zone (exclusive of area contained within the newly protected areas). Appendix IX summarizes the Unique Areas that have been designated on the Queens-Charlotte License.

Our management strategy for the Unique Areas zone on the License is to manage each area to maintain and protect the unique feature or attribute. Forest harvesting is not necessarily prohibited within Unique Areas, however, any management activity must be completely compatible with protecting that special feature. In many of the Unique Areas harvesting is not appropriate. In some areas however, very light harvesting activity or salvage harvesting may be acceptable from time to time. Prior to any harvesting activity within a designated Unique Area, our company policy requires that a management plan be developed specifically for the particular Unique Area.

For the purpose of management planning for the Queens-Charlotte License, we have assumed that only salvage, or selection harvesting will be undertaken within the Unique Areas zone on the land base. We have conservatively proposed that, for allocation purposes, that an average of 1,100 m3/year could be salvaged from this Unique Areas zone. The species breakdown of this total volume is estimated to be as summarized in Table 14.

Table 14. Proposed harvest levels by species group for "Unique Areas on the Queens-Charlotte License (after "operational" net downs).

	Spruce/Fir/Jack Pine m^3/year	Hardwood m^3/year	White Pine m^3/year	Cedar m^3/year
AAC	600	200	200	100

Note: These volume estimates have been "netted down" to account for operational issues and product yield expectations.

Deer Wintering Area Management Units

DNRE has established a policy and management requirement that designated areas (where there has been evidence of significant deer wintering activity) must be managed with a primary objective of maintaining or improving the long-term area of "critical deer wintering habitat". There are 107 designated DWAMUs located on the Queens-Charlotte License, ranging in size from over 3,000 hectares to less than 100 hectares. It is required that a Management Plan be developed and approved for each specific DWAMU prior to undertaking harvesting within the unit. Since 1997, J. D. Irving, Limited has developed Management Plans for 52 of the 107 DWAMU's on the Queens-Charlotte License. To date, 40 of these plans have been approved by DNRE, an additional 9 deer yards have been cruised, and 3 drafted plans have been submitted to DNRE for approval. This information is summarized in Appendix X.

Winter habitat is important to maintaining deer populations in New Brunswick. Deer experience conditions of cold and deep snow, which causes stress by limiting movement and the availability of food. Two habitat types have been identified as important to winter survival of deer: Moderate Winter Deer Habitat (MWDH) and Severe Winter Deer Habitat (SWDH). MWDH is provided by stands with high food value and at least some cover for thermal shelter. Deer access MWDH when snow and temperature conditions do no restrict mobility. SWDH is provided by dense softwood stands with better thermal cover value and some browse available. Deer use SWDH when deep snow and very cold temperatures limit access to other stand types.

The 80 year profile of winter deer habitat under a no harvest scenario is depicted in Figure 11. Over time, the severe habitat declines and the moderate habitat steadily increases, reaching it's peak in period 11 (20,750 hectares).

The 80 year non-spatial profile of winter deer habitat under a modest harvest strategy (greater that the harvest levels we have proposed) is depicted in Figure 12. In comparison to the No Harvest Scenario, the Severe Habitat level is slightly improved, while the Moderate habitat level is slightly reduced.

From Appendix X it is apparent that there has been a major focus of management activity within DWAMU's on the Queens-Charlotte License during the 1997-2001 planning period. Based upon these recently completed plans, it is also apparent that there will be a significantly reduced level of harvesting activity within DWAMU's on the License during the 2002-2007 management period. Based upon the level of harvesting projected from the previously completed DWAMU plans, and estimating a level of activity within previously unmanaged DWAMU's (and allowing for a level of new information); we are projecting and proposing the levels of harvesting activity outlined in Table 15.

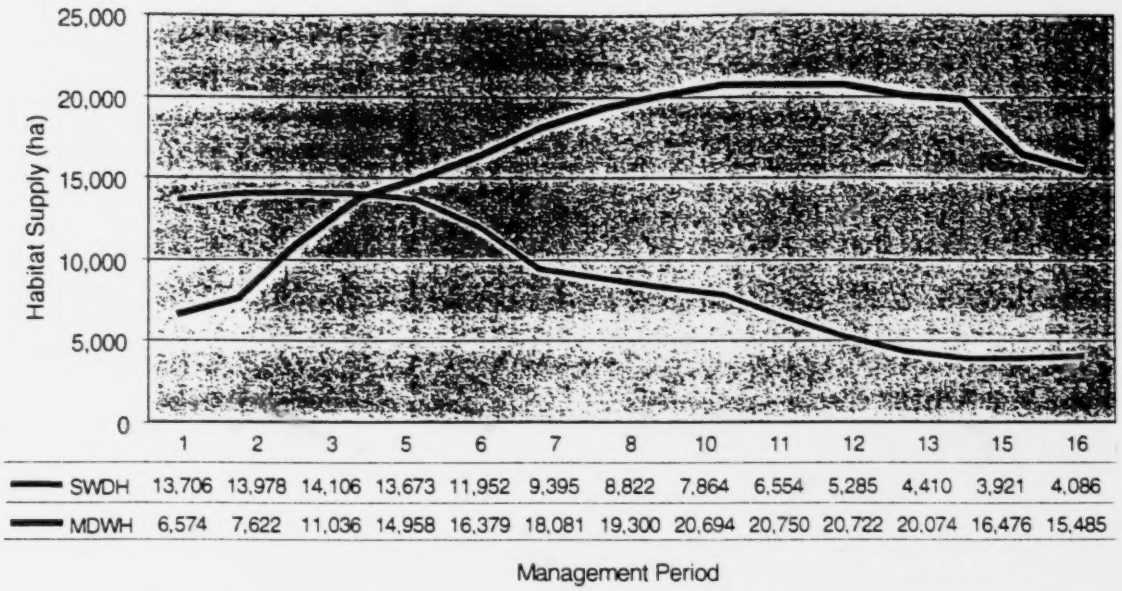

Figure 11. Projected Moderate (blue) and Severe (red) Winter Deer Habitat levels from the DWAMU Zone of the Queens-Charlotte License without harvest interventions.

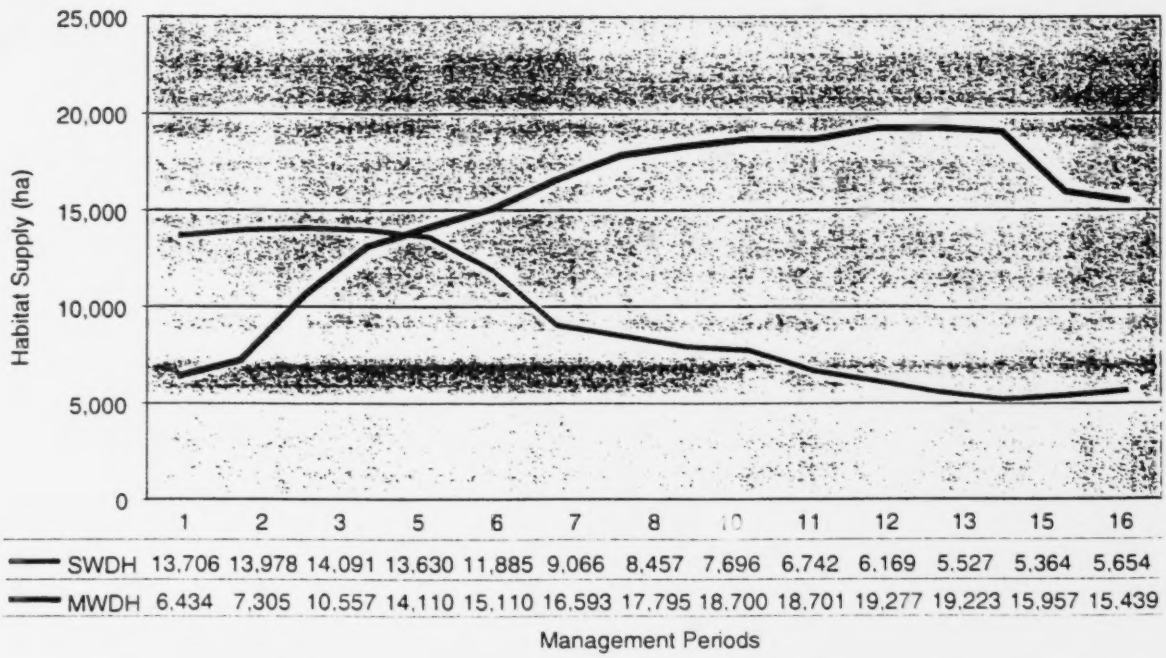

Figure 12. Projected Moderate (blue) and Severe (red) Winter Deer Habitat levels from the DWAMU Zone of the Queens-Charlotte License with harvest interventions.

Table 15. DWAMU harvest expectations by period on the Queens-Charlotte License.

Period	Harvest Level				Silviculture Level	
	Sp/Fir/ JP m^3/Period	Hardwood m^3/Period	White Pine Sawlogs m^3/Period	Cedar Saw Material m^3/Period	Planting ha/Period	PCT ha/Period
1997-2001	96,755	52,109	8,933	0	298	1,616
2002-2006	47,000	24,000	4,300	0	192	652

Note: These volume estimates have been "netted down" to account for operational blocking issues and product yield expectations.

The proposed level of activity within DWAMU's during the 2002-2006 period, is based upon developing new plans for approximately 400 hectares of DWAMUs, and implementing "follow-up" plans for approximately 10,400 hectares of DWAMU. The specific DWAMUs we anticipate operating during the 2002-2006 period are summarized in Table 16.

Table 16. DWAMU's on the Queens-Charlotte License planned for management plans and harvest activity during the 2002-2006 Period

DWAMU	Area (hectares)	Type of Plan
DW445803	128	Follow-up
DW456001	167	Follow-up
DW463701	168	Follow-up
DW473801	75	Follow-up
DW473802	165	Follow-up
DW473803	127	Follow-up
DW483601	1,513	Follow-up
DW493701	882	Follow-up
DW494201	2,778	Follow-up
DW564301	3,363	Follow-up
DW564401	1,050	Follow-up
DW426301	151	New
DW456501	131	New
DW524001	110	New

It should be noted that while we are committed to implementing Management Plans for at least 10,800 hectares of DWAMUs during the 2002-2006 period, the specific DWAMUs planned, may vary somewhat (due to on the ground conditions).

It is also important to note that there are 23 very small (less than 100 hectares in size) DWAMUs presently designated on the Queens-Charlotte License. Under most circumstances, it is not our intent, nor is it operationally practical to develop a specific

Management Plan for such small areas. We are willing to work with the DNRE staff to develop appropriate strategies and do appropriate harvest and silvicultural prescriptions within these very small Deer Wintering Areas. We believe that DNRE should develop alternative streamlined Management Plan requirements (in consultation with licensees) for very small (less than 100 hectares in size) DWAMUs.

Old Spruce-Fir Habitat Blocks

The New Brunswick DNRE has established "Old Spruce-Fir Habitat" (OSFH) objectives for each Crown License. These objectives are based upon the theoretical habitat requirements of the American Pine Marten and also provide for approximately 28 other dependant wildlife species. The minimum desired patch size for OSFH blocks is 375 hectares, with at least 75% of the block area meeting the OSFH criteria, and a normal block width exceeding 1,000 meters. OSFH blocks have been spatially identified for the next 35-years on each Crown License. Net OSFH objectives established by DNRE for eco-region on the Queens-Charlotte License, are summarized in Table 17.

Table 17. Old Spruce-Fir Habitat objectives for each Eco-region on the Queens-Charlotte License.

Eco-region 3	Eco-region 4	Eco-region 5	Eco-region 6	Eco-region 7	License Total
1,760 ha	1,330 ha	13,790 ha	9,980 ha	1,810 ha	28,670 ha

Over the past several months, J. D. Irving, Limited staff have developed a database and maps outlining stands on the License that meet the stand level criteria to provide OSFH habitat during periods over the next 35 years. DNRE staff and JDI foresters have reviewed this information, and have aggregated appropriate stands into OSFH blocks. After further analysis and several iterations, JDI staff have designated 26 OSFH blocks on the Queens-Charlotte License. These blocks have been reviewed and approved by DNRE staff.

An area summary for the designated OSFH blocks is shown in Table 18 (for more detailed information refer to Appendix XI). In reviewing the summarized information, it is apparent that while the total net OSFH objective for the Queens-Charlotte License has been met in each of the next seven five-year periods; the OSFH objective for each specific eco-region has not necessarily been achieved in each period. It may also be noted that DNRE wildlife biologists have accepted and approved each of the designated OSFH blocks, however several of these blocks do not achieve the desirable threshold of at least 75% of the block area in habitat providing stands.

Specifically, the following OSFH objectives were not achievable on the Queens-Charlotte License:

- the 1,760 hectares OSFH block objective in Eco-region 3,
- the 1,330 hectares OSFH block objective in Eco-region 4,
- the 9,980 hectares OSFH block objective in Eco-region 6, and
- the 1,810 hectares OSFH block objective in Eco-region 7.

Table 18. Area summary of Old Spruce-Fir blocks on the Queens-Charlotte License.

Elc Region	Block #	Periods in Effect		Total ha	Hectares of Habitat by Period						
		Start	Finish		Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7
03	MC453401	1	2	1,114	927	945					
03	MC463201	1	7	490	409	409	409	420	420	420	420
03	MC473301	1	7	1,182	881	901	910	959	964	970	970
03	Total			2,785	**2,217**	**2,254**	**1,319**	**1,378**	**1,384**	**1,390**	**1,390**
04	MC436301	3	7	1,295			884	921	960	986	1,027
04	MC466501	3	7	606			424	435	450	465	500
04	MC466502	3	4	1,303			823	913			
04	MC466701	4	7	861				634	638	640	648
04	Total			4,064	**0**	**0**	**2,131**	**2,903**	**2,048**	**2,091**	**2,174**
05	MC426101	1	7	3,073	1,953	2,149	2,494	2,588	2,564	2,584	2,609
05	MC456401	1	7	787	535	543	574	587	630	630	630
05	MC466302	1	7	2,575	1,934	2,012	2,093	2,154	2,212	2,204	2,228
05	MC473301	1	7	867	640	641	661	694	694	699	692
05	MC473501	1	7	1,262	1,043	1,035	1,042	1,046	1,046	1,078	1,071
05	MC474201	1	7	1,663	1,150	1,197	1,219	1,279	1,279	1,279	1,253
05	MC493401	1	7	2,654	1,943	2,001	2,025	2,043	2,035	2,051	2,055
05	MC494301	1	3	782	549	549	549				
05	MC493801	1	1	997	672						
05	MC494401	1	7	1,037	735	735	749	756	781	781	784
05	MC504501	1	2	1,765	1,117	1,160					
05	MC513501	1	7	711	488	509	509	519	519	522	528
05	MC513701	1	2	790	560	567					
05	MC513701	1	3	1,198	897	960	971				
05	MC513701	1	7	2,240	1,382	1,422	1,464	1,683	1,746	1,833	1,866
05	MC514401	1	7	1,360	908	943	943	967	1,077	1,077	1,077
05	Total			23,758	**16,508**	**16,423**	**15,293**	**14,316**	**14,583**	**14,738**	**14,793**
06	MC563901	1	7	833	645	645	645	645	645	647	648
06	MC564301	1	7	1,485	1,105	1,181	1,201	1,201	1,217	1,217	1,217
06	MC573801	1	7	9,645	6,628	6,765	6,899	7,031	7,532	7,745	7,739
06	MC574501	1	7	541	375	375	375	389	389	389	389
06	MC584501	1	7	1,202	841	995	1,000	1,000	1,000	1,013	1,013
06	Total			13,706	**9,594**	**9,962**	**10,121**	**10,267**	**10,783**	**11,011**	**11,006**
07	MC544601	1	7	521	370	461	461	461	476	476	476
07	Total			521	**370**	**461**	**461**	**461**	**476**	**476**	**476**
ALL	License Total			44,834	**28,689**	**29,100**	**29,325**	**29,326**	**29,273**	**29,705**	**29,839**

Additional stands providing suitable OSFH also exist throughout the Queens-Charlotte License. A summary of the total OSFH within each zone on the License at various times in the future, according to the management strategy outlined in this proposal, is shown in Table 19.

At the non-spatial proposal stage, a long term "Gross OSFH Objective" of 86,297 hectares was established for the Queens-Charlotte License. As shown in Table 19, this level is achieved throughout the 25 year management plan. Our management strategy for the Queens-Charlotte License will ensure that at least 86,297 hectares of Gross OSFH habitat is maintained throughout the 80 year planning horizon.

Table 19. OLDSF habitat levels reported in Hectares by period in each management zone for the Queens-Charlotte License

Period (years)	Protected Areas	Unique Areas	DWAMUs Area	Watercourse Buffers Area	General Forest Area	OSFH Blocks Area	Total gross habitat*
2002-2006	5,264	4,587	19,228	17,155	72,333	17,922	136,489
2007-2011	5,704	5,085	20,030	18,060	58,974	18,403	126,256
2012-2016	6,006	5,306	20,545	18,875	42,381	19,255	112,368
2017-2021	6,152	5,423	21,063	19,381	33,582	19,979	105,580
2022-2026	6,783	5,527	21,598	20,014	31,893	20,249	106,064
2027-2031	7,031	5,563	22,187	20,711	32,180	20,330	108,002
2032-2036	7,382	5,929	22,794	21,062	34,243	20,655	112,065

* Areas are mutually exclusive (areas are tallied in order of protection priority)

Harvesting within OSFH blocks is outlined for two different situations:

- within specific stands that are not required to provide old spruce/fir habitat: and
- within OSFH stands, without compromising their ability to provide old /spruce/fir habitat.

Different objectives and a different strategy are implemented for each of these situations:

- Within each designated OSFH block are stands that have never met, or are no longer suitable to provide Old Spruce/Fir Habitat. These stands are planned to be accessed and harvested using an appropriate harvest prescription.
- Those stands within OSFH blocks that are providing habitat, or are planned to provide Old Spruce/Fir Habitat in the future, may undergo some harvesting, provided that the post-treatment attributes of the stand still meet the Old Spruce/Fir Habitat requirements. Depending upon the specific stand characteristics, shelterwood, commercial thinning, salvage harvests, single tree selection, or group selection prescriptions may be acceptable and appropriate.

Several analyses were undertaken on the OSFH land base to determine a proposed AAC from the land base. We have "netted-down" this analysis results significantly, and have proposed harvest levels, as summarized in Table 20.

It is important to note, accept, and approve that in order to derive the harvest levels proposed from Old Spruce/Fir blocks, it will be necessary to build roads within these OSFH blocks. Without the acceptance and approval to build roads to access eligible stands, it will not be possible to derive the expected AAC from the OSFH blocks.

Since the initial submission of our Management Plan in April 2001; DNRE has revised its policies and procedures for operating in Old Spruce/Fir blocks (Mr. Reid's letter of July 4, 2001). Based upon that change, and assuming agreement from DNRE field staff that our strategy and proposed harvest levels are reasonable and achievable; we have increased our planned spruce/fir harvest level from these areas by 2,000 m3/year. These revised levels are indicated in Table 20.

Table 20. *AAC* within OldSF Blocks on the Queens-Charlotte License (after operational net downs).

Stands/Period	Harvest Level				Silviculture Level	
	SP/Fir/JP m^3/year	Hardwood m^3/year	White Pine m^3/year	Cedar m^3/year	Planting m^3/year	Pct m^3/year
Non-OLDSF Habitat Stands 2002-2026	3,300	1,300	200	0	31	26
OLDSF Habitat Stands 2002-2026	2,200	200	0	100	12	9
Total OLDSF Habitat Blocks 2002-2026	5,500	1,500	200	100	43	35

As per the request of DNRE, we have done further analyses to review the OSFH levels at year 2052 on the Queens-Charlotte License. We have prepared a map outlining the location of OSFH stands at year 2052 under the proposed Management Plan for the License. This map also highlights the eco-regions along with the designated OSFH blocks for the period from 2002 to 2037. In reviewing the location of future OSFH stands, it is readily apparent that the opportunity to group stands into suitable OSFH blocks quickly improve after 2037. Maps showing this information (OSFH stands at 2037, 2047, and 2052), as well as a map showing OSFH stands if all harvesting on the License stopped after 2002) is included in Appendix XII. From these analyses, we have concluded that the availability of suitable OSFH block in the long term (35 to 50 years in the future) significantly improves with our Management Plan for the Queens-Charlotte License.

As already noted, we do have major concerns about the present OSFH criteria and objectives. We feel it is most important that DNRE (in consultation with Licensees) review and revise these OSFH criteria and objective. We believe that there is a strong scientific rationale for revising the Old Spruce/Fir habitat definitions. We also recommend that DNRE review that rationale and basis for setting the net OSFH levels for each eco-region.

Watercourse and Highway Buffer Zones

Special management zones along each side of all watercourses are a requirement. In addition, DNRE has required that approximately 694 ha along major highways be buffered for aesthetic purposes. These buffer zones are managed with a primary objective of protecting water quality and providing wildlife habitat, and travel and connectivity corridors. Specifically, there is a "no tracking zone" within 15 meters of any watercourse with a channel width greater than 0.5 meters. The remainder of the zone is managed in an effort to provide long term crown closure within the zone. Depending upon the particular stand conditions, a variety of harvest prescriptions might be utilized. Except in extenuating circumstances, large openings would not be created within watercourse buffer zones. Single tree selection, group selection, or salvage operations would most often be prescribed, however, some shelterwood harvests or small patch cuts might be utilized in specific stand conditions.

A summary of the area within mapped watercourse buffer zones is outlined in Table 21.

Table 21. Width and area of productive forest buffered on the Queens-Charlotte License.

	Buffer Width	Total Area Buffered (ha)	Productive Forest Area Buffered (ha)
Buffered Highways	60 m	1,157	694
Single Line (Streams)	60 m	64,306	47,770
Double Line Streams	85 m		
Rivers	110 m		
Lakes	100 m		
Total Buffers		65,463	48,464

As noted in Table 21, 65,463 hectares, or almost 12% of the Queen-Charlotte land base is located within designated buffer zones. It is important to note that in addition to mapped watercourses there are also significant buffer areas required for unmapped streams. These unmapped streams do not always require or receive 60 meter buffers, however in order to ensure that there is no risk of erosion, even intermittent streams require three-meter no tracking zones. In our recent experience we estimate that 4% of our harvest block area is constrained by buffer zones for previously unmapped streams. In order to account for unmapped streams, we have "netted down" our expected harvests by an additional 3%

(these net downs are reflected in the AAC figures presented in this document).

Our management strategy for the watercourse buffer zone is to prescribe an initial harvest intervention into mature or over mature stands, within the next 25-years. It is intended that this zone may be operated (pre-operated) completely independently of adjacent harvest blocks in the General Forest Zone. Due to difficulties of access and logistical constraints, in our original April 2001 Management Plan Submission we only planned that approximately 50% of the watercourse buffers would actually be entered. Using broad averages, we estimated that the removal level will be less than 40 m3/ha (modeled as 32 m^3/ha removal all species) outside the 15 meter no tracking zone. We believe that 70% of the volume removed will be spruce/fir/Jack Pine.

Since our initial April 2001 Management Plan submission, DNRE has revised the policies and procedures to apply for and carry out operations within Watercourse Buffer Zones (Mr. Reid's letter of July 4, 2001 and Mr. Volpes letter of December 3, 2001). Based upon these interpretations, we have revised our proposed level of activity within Watercourse Buffer Zones. A summary of our revised proposed harvest levels by species groups for the next 25-years is outlined in Table 22.

Table 22. Area and volume harvested (after "operational" net downs) within watercourse buffer zones on the Queens-Charlotte License over 25 years.

Period (year)	Annual Harvest Area (ha)	Spruce/Fir /Jack Pine m^3/period	Hardwood m^3/period	White Pine m^3/period	Cedar m^3/period	Total m^3/period
2002-2026	625	12,000	2,500	300	200	15,000

For the purposes of landscape level management planning, we will be prescribing relatively light harvesting prescriptions that we feel will not compromise or affect the stand's pre-treatment habitat or forest community characteristics.

Recreation

Recreation is another important use and management consideration on the Queens-Charlotte License. While fishing and hunting are major recreational uses of the Crown License, there are also many other popular activities including:

- hiking,
- snowmobile or All Terrain Vehicle use,
- canoeing,
- bird watching,
- nature appreciation,
- plus numerous other outdoor pursuits.

J. D. Irving's staff have contacted and consulted with recreational groups, community groups, DNRE, our employees, and the general public in order to be aware of, and informed about recreational sites and uses on the Queens-Charlotte License. We have made a formal note of many of these sites and much of this information has been incorporated into our GIS database. We intend to update our knowledge about recreational areas on the License, on a continual basis.

Harvesting operations are not usually prohibited on recreational sites; and our intention is to manage these as multiple-use management areas. In specific situations where forest harvesting is not compatible with a recognized and designated recreational primary use objective, we have incorporated those sites into our "Unique Areas" program. We have not otherwise assumed there to be any AAC impact of managing for recreational use on the Queens-Charlotte License.

WOOD SUPPLY AND HABITAT ANALYSES

Base Line Objectives

A primary objective on the Queens-Charlotte License is to maximize the sustainable supplies of quality timber products while providing for non-timber values including maintenance of biodiversity and specific wildlife habitats, protection of water quality, preservation of unique and recreationally important areas, and facilitation of public input.

Specific objectives incorporated into our analysis for the General Forest Zone include:

- The annual harvest level for spruce/fir/Jack Pine will be sustainable (i.e., non-declining).
- The prescribed harvest levels for hardwood, White Pine and Cedar will be such that the long term potential of these species is not compromised.
- Harvest strategies will be focused upon the production of higher valued forest products.
- Quality tolerant hardwood or tolerant HS stands, and predominant Cedar stand types will be managed to retain their existing classification.
- Appropriate silviculture will be utilized to promote natural regeneration and ensure adequate stand level stocking to improve the growth, yield and quality of forest stands.
- Forest vegetation community types will be maintained by eco-region as identified in Table 23.
- A proportion of the land base must be maintained in "old forest" conditions meeting specific wildlife and habitat requirements.

Table 23. Vegetation community and wildlife objectives for the Queens-Charlotte License.

Vegetation Community	Community Objective by Eco-region (ha)				
	3	4	5	6	7
THP	700 | 1650[4]	0	3340	0	0
THSW	560	280	4260	2610	610
SP	1710	1570	11100	3470	950
BF	310	0	0	0	0
BS	0	0	3980	8000	1280
EC	0	240	1680	0	0
PINE	0	80[5]	1080[5]	2030[5]	190[5]
JP	0	0	0	2620	180
OHWH[1]	200	180	1830	920	280
OSFH[2]	1760	1330	13790	9980	1810
OMWH[3]	860	680	6020	3430	990
LMWH[3]	100	120	980	540	160

[1] *OHWH* – Overlaps with IHSW,THSW and THP, a separate habitat window will be applied to all eligible curves
[2] *OSFH* - Has spatial requirements and may contain any of SP,BF,BS,EC, a separate habitat window will be applied to all eligible curves
[3] *OMWH, LMWH* - May overlap with any/all vegetation communities except THP, a separate habitat window will be applied to all eligible curves
[4] Due to Habitat *OTHH* objective being higher, this total of THP + THSW must be maintained
[5] Due to Habitat *OPIH* objective

Management Planning Tools and Methodology

Forest management planning is a hierarchical process in which strategy precedes tactics in the same way that the plan itself must precede its implementation. At the highest level of the hierarchy, is the strategic planning phase. Its goal is to identify a long term (80 years or more), forest level set of treatment types, amounts and timing choices that will meet forest management objectives. This planning level utilizes strata or class based description of the forest and spatial detail is decidedly coarse.

The tactical level of planning has a much more geographically localized focus and a shorter planning horizon (25-years or less). In this planning phase, the chosen class based strategy is translated into a map based, site or stand specific harvest plan. The plan is implemented through a series of highly detailed, annual operating plans in which field staff may alter and adjust prescriptions and timing based on specific stand conditions.

The forest management planning process is also cyclical in nature. As information, objectives, tools and the land base itself change over time, management plans, both strategic and tactical, must be re-visited and adapted as well. Just as the tactical, map based harvest schedule is a sustainability check against the long term strategy; the modification of management plans at regular intervals gives some insurance against unforeseen circumstances or erroneous assumptions. The management planning process on New Brunswick crown land is repeated every five years.

The strategic phase of this management plan for the Queens-Charlotte License was developed using the WoodStock® forest modeling system. Inputs to the model include:

- a current description of the forest derived from forest inventory data, (provided from the GIS data base)
- a set of harvest and silviculture treatment options and the rules for their application, and
- a quantitative prediction of how the forest will change over time with respect to feasible interventions.

Given these inputs and a particular set of objectives and constraints, the WoodStock® system uses linear programming to identify the optimal strategy and treatment schedule.

In addition to the WoodStock® modeling system, the following tools were utilized in preparing this management plan:

- Arc/Info geographic information system (GIS) in preparing the forest inventory data, storing the block plan in digital format, and in producing map products,
- Arc View desktop GIS in overall management of the database (querying, classifying, displaying), in editing of the block plan, and in producing map products,

- Stanley, a harvest block scheduling software package employed to select potential managed stands for harvest interventions.

- Staman stand growth and yield model in stratification and prediction of growth and yield over time.

- Numerous other software tools including Microsoft Excel, Access, Power Point and Word.

Data Sources and Methods

The land base for the Queens-Charlotte License was characterized from the digital forest inventory maintained in a Geographical Information System (GIS) located in Saint John, New Brunswick. This inventory was initially developed from aerial photography (true color) at a scale of 1:12,500. The photo interpretation was verified on the ground by using a network of Forest Development Survey (FDS) plots. Compilation of the land base was completed as follows:

All "Special Management" Zones including: watercourse buffers, deer wintering area management units, unique areas and reserves, old spruce/fir habitat blocks, and the proposed protected areas were entered into the inventory data base. An intersection of the forest stands with these "Special Management" zones defines the area by stand type in the constrained and unconstrained forest.

Regular annual updates for harvesting and silviculture treatments were incorporated making the inventory current until the end of the 1998-operating year for harvesting, and the end of the 1999 operating year for silviculture.

The merchantable forest was characterized from the photo interpretation using development patterns and age distributions provided from the FDS data. JD Irving, Ltd. staff built local volume tables and stocking tables in the process of yield curve construction. The Staman model was employed to build the yield curves.

Commercial thinning of plantations and natural spaced stands were characterized using growth rates from the re-measurement of permanent sample plots (PSP's) in managed stands on the New Brunswick Crown lands.

Modeled Forest Area

As previously noted, the total area for Queens-Charlotte License is 567,587 hectares. Eighty-nine percent of the area (505,219 hectares) is capable of growing trees. The remaining 11 percent of the land base is contained in wetlands, bogs, roads, old gravel pits, and water, which have not been modeled.

The 505,219 hectares of productive land, has been sub-divided into management zones. To avoid double counting where restrictions overlap, these "Special Management" areas have been classified according to their primary management objective. Specific management objectives, associated strategies, and implementation issues for the individual forest zones is discussed below. Table 24 identifies the six forest zones by productive land. The General Forest Zone makes up 75 percent of the productive land base. The remaining 26 percent represent areas where the primary objective is non-timber driven.

Table 24. Productive Forest Zoning on the Queens-Charlotte License.

Management Zones	Total Land Area (Exclusive)	Percent of Productive Forest Area (%)	Productive (hectares)
General Forest Zone	415,524	75%	377,563
Protected Areas	22,653	4%	19,200
Unique Areas	17,693	2%	9,070
DWAMU's	38,767	7%	36,127
Old Spruce/Fir Blocks	25,218	6%	28,389
Watercourse/Highway Buffers	47,750	7%	34,870
Total Productive Forest	567,587	100%	505,219

Wood Supply Trade Off Involved in Strategy Choices

Using the information on forest condition, stand yields and treatments, a series of aspatial or class based analyses were conducted. The purpose of the analysis identified issues, opportunities and impacts influencing the Queen-Charlotte Crown forest under a host of management alternatives. The intent of these analyses was to develop a strategy that satisfied all objectives for the land base over an 80 year time horizon. This section presents and discusses the results of these analyses, their implications to management of the Queens-Charlotte License, and the reasoning behind the strategy chosen for implementation. Implementation issues associated with the chosen strategy are also discussed.

Benchmark Scenarios for the "General Forest Zone"

In order to select a chosen management strategy for the Queens-Charlotte License, a series of more than 10 benchmark strategies were modeled and analyzed. The aspatial analyses were conducted using the WoodStock® forest modeling system. Forecasts are based on an 80 year time horizon in which year 2002 represents Year 1 of the forecast. Unless otherwise indicated, all AAC results in this section are reported for the General Forest Zone only (505,219 productive forest hectares). However, the entire forested land base does contribute to the overall habitat and biodiversity objectives. Table 25 provides a description of several wood supply scenarios investigated to evaluate the forests performance with respect to meeting timber and vegetation community objectives established for the Queens-Charlotte License.

Table 26 provides a comparison of several of the pertinent wood supply analyses conducted.

Table 25. Aspatial Benchmark Analyses for the Queens-Charlotte License.

Run	Brief Scenario Description
0.0	Do Nothing, With no harvesting and no silviculture - Watch the forest grow/decline over 80 years.
2.0	Max. Spruce/Fir, Introduce Commercial Thinning in Plantations & Pre-commercial thinnings
3.0	Max. Spruce/Fir, Introduce Planting (percentage by species - Jp capped at 15%)
4.0	Max. Spruce/Fir, Introduce Pct
5.0	Max. Spruce/Fir, Introduce Select, Group, and Multiple Entry Harvest
6.0	Max. Spruce/Fir, Establish Biodiversity Targets
7.0	Max. Spruce/Fir, Capped Planting and Pct regime at 1997 levels, Capped Harvest Prescription Levels
8.0	Max. Spruce/Fir, Increase the Short term Silviculture program
9.0	Max. Spruce/Fir, Capped the fluctuation of intolerant Hardwood over time
11.0	Max. Spruce/Fir + Tolerant Hardwood, Include Harvest levels to year end 2001

*spruce/fir/jack pine = sfj

Table 26. Results from the Aspatial Wood Supply Analyses

Run	Spruce/Fir/Jack Pine m3/year	Planting ha/year	Pre-commercial Thinning ha/year
0.0	0	0	0
2.0	509,000	0	0
3.0	683,000	2,000	0
4.0	765,000	2,000	2,100
5.0	798,000	2,000	2,100
6.0	798,000	2,000	2,100
7.0	790,000	2,100	1,900
8.0	826,000	4,500	2,500
9.0	826,000	4,500	2,500
11.0	767,000	3,150	3,100

The very first model run (0.0) investigated the long-term stability of the forest under a no harvest, no silviculture scenario. In other words, do nothing and watch how the forest's growing stock changes over the next 80-years.

The results of run 0.0 are very interesting because the increase in growing stock trend is different from previous analyses. In previous analyses, the growing stock decreased in the first 25-years of the planning horizon, then steadily increased as plantations and pre-

commercial thinning became operable. However, in the current analysis the softwood growing stock indicates a strong positive net growth due to the following factors.

- Over the past fifteen years, older stands were harvested to minimize volume loss due to mortality,

- The remaining forest is younger, healthier, and exhibiting a net positive growth, and

Recently collected FDS plot data, and re-measurements in Permanent Sample Plots has confirmed these trends, and resulted in revised increased growth and yield forecasts.

Run 2.0 introduced commercial thinning (in both spruce plantations and pre-commercial thinning in regenerating stands). The net result was an 80 year harvest rate of 509,000 m^3/year.

The subsequent next two runs (3.0 and 4.0) were targeted on silviculture. In Run: 3.0 2,000 hectares/year were planted in order to sustain a SFJ AAC of 683,000 m3/year. The jack pine planting level was capped at 15 percent of the annual program. In addition to planting, Run 4.0 introduces a pre-commercial thinning program of 2,100 hectares, which increased the SFJ AAC to almost 765,000 m^3/year.

At this point in the analysis (Runs 1-4) only clear cutting was the choice of harvest prescription. However, stands that were not eligible to be clear-cut (i.e. Pure cedar Stands, Tolerant Stands, etc.) were not included in the harvest queue. By adding in these stands and multiple entry harvest systems (Run 5) the SFJ AAC climbs to 798,000 m3/year. At this point biodiversity has still not been established as a strategic objective, which indicates why clear-cutting is still the dominate choice for harvesting timber in this scenario.

An increasing growing stock provides an opportunity for multiple entry harvest without a negative effect on the AAC. This has been proven in Run 5. By introducing biodiversity objectives into the analysis, the net result of maintaining the forest vegetation communities and habitat levels yields a Spruce/Fir/Jack Pine AAC of 798,000 m3/year (Run 6.0). In other words by managing for diversity on the Queens-Charlotte license, there is neither a positive nor a negative impact with respect to the AAC calculation. At this point it should be noted that the AAC is calculated from the General Forest Zone only, but the over all vegetative and habitat levels include the entire license.

The next step in the wood supply analysis was to incorporate local field knowledge (with respect to harvest prescriptions). Our foresters assigned appropriate prescriptions to each forest community type. As a result of setting up the wood supply model to follow these prescriptions, the Spruce/Fir/Jack Pine AAC decreased by 8,000 m3/year to 790,000 m3 annually (Run 7.0).

Since we are currently at (beyond) the low point in the merchantable growing stock, there is an opportunity to increase the AAC with silviculture. Run 8.0 incorporated a higher planting

level of 4,500 hectares/year and maintains 2,500 hectares/year of pre-commercial thinning for the first 2 periods. The analysis did not try to even-flow the silviculture levels due to the biodiversity objectives. The outcome from Run 8.0 yielded a SFJ ACC of 826,000 m3/year. The higher planting level in Run 8.0 compared to Run 7.0 benefits the Spruce/Fir/Jack Pine AAC by 4 percent in the short term. Although the bump up in the long term AAC has not been calculated, the increase in growing stock clearly demonstrates this opportunity 30 to 40 years in the future.

Run 9.0 simulated reducing the variance in the hardwood harvest. Although the level of hardwood volume harvested spike only at the very end of the planning scenario, an even-flow constraint for intolerant hardwood was applied. The AAC remained the same as the previous run.

Run 11.0 takes into account all the goals and objectives discussed in the above runs. This model run ensures a sustainable level of spruce/fir/jack pine harvest products while meeting the biodiversity objectives and increasing the merchantable growing stock well into the future. Run 11 also includes additional harvest/silviculture in period 1 to account for forest operations in 2000 and 2001. The AAC for run 11.0 is 767,000 m3/year (sfj), which is 7% lower than run 9.0. This 7% reduction is largely a cost of accounting for the 2000/2001 harvest years.

Upon review of our proposal, DNRE requested that J.D. Irving, Ltd. make several adjustments and changes to the management strategy. In addition some minor corrections have been subsequently made to our August, 2000 proposal submission. Some of the key indicators related to the Aspatial Baseline Strategy are summarized in Table 27 and Table 28.

Table 27. Summary of the proposed harvest levels in the General Forest Zone of the Queens-Charlotte License under the aspatial baseline analysis.

PERIOD	PROPOSED HARVEST LEVEL - m^3 per year				
	Spruce/Fir/Jack Pine	Hardwood	White Pine	Cedar	Total
2002-2006	800,000	320,000	25,320	100,522	1,245,843
2007-2011	800,000	350,000	35,997	40,463	1,226,461
2012-2016	800,000	320,000	84,897	36,392	1,241,288
2017-2021	800,000	320,000	63,935	20,609	1,204,544
2022-2026	820,000	320,000	51,639	13,151	1,204,790
2002-2026 Average	804,000	326,000	52,358	42,227	1,224,585

Table 28. Summary of proposed silviculture program for the General Forest Zone on the Queens-Charlotte License from the aspatial baseline analysis.

Period	Proposed Silviculture Levels - Hectares Per Year			
	Tree Planting	Pre-Commercial Thinning		
		Softwood	Mixed Wood	Hardwood
2002-2006	2,988	2,607	805	30
2007-2011	3,470	1,846	1,244	190
2012-2016	2,694	2,582	622	77
2017-2021	3,191	2,269	360	652
2022-2026	3,460	2,383	422	476
2002-2026 Average	3,161	2,337	691	285

It is important to note that the theoretical modeled results must be netted down in order to account for:

- operational blocking constraints,
- low volume inoperable stands,
- unmapped streams and sensitive areas,
- leaving stand remnants and providing structural and biological diversity,
- product yield adjustments for certain species/products, and
- hardwood prescription adjustments.

The theoretical analyses have assumed an optimum scheduling for each and every stand on the license. Operationally, it is neither possible nor practical to access and operate every stand in this manner. It has been our experience that the conservative net down to account for operational blocking constraints is approximately 15%.
There are some forest stands that due to their low volumes, will be deemed inoperable when adjacent stands are harvested. We are estimating that a net down of 5% will adequately account for inoperable stands that will not be harvested within the next 25-years.

There are numerous unmapped streams that occur within operating blocks. Depending upon the width and drainage of these features, they also require buffers varying from 5 to 60 meters. We sampled several recent harvest blocks to determine the extent and wood supply impact of unmapped streams. Our survey revealed that approximately 4% of the blocked area occur within buffers on unmapped streams. Some level of light harvesting is acceptable and appropriate within these buffer zones, however we are assuming and proposing that a further net down of approximately 3%, be applied for unmapped stream buffers.

Our clear-cut harvest prescriptions (variable retention and over story removal) no longer remove all merchantable stems on the harvest block. In order to maintain structural and biological diversity within the area, we have established BMPs that require retention of legacy trees, stand remnants, cavity and wildlife trees, clumps, islands, and other important features that provide structural and biological diversity. We are estimating that, on average,

approximately 3% of the total block volume will be maintained post-harvest entry for these purposes. It is important to note; however, that certain species (Cedar, Hemlock, and hardwood) will be favored for retention.

The AAC of several species including White Pine and Cedar must be substantially adjusted in order to account for cull volume and the expected yield of specific high grade products. In order to determine the availability and AAC for White Pine saw logs, we are assuming that 75% of the total merchantable volume will be saw log grade. Currently there is a high cull factor and no market for pulp grade Cedar. We are proposing to utilize a 50% net down for Cedar saw material.

In developing our blocked plan for the General Forest Zone we have sometimes included smaller stands with a significant tolerant hardwood component within a larger harvest block. In some instances the larger block has been scheduled to receive a variable retention harvest prescription. This prescriptions may not be totally appropriate from some of the smaller tolerant hardwood stands within these larger blocks. At an operational level, it is our full intention to carry out an appropriate tolerant hardwood prescription, provided that the stand is at least 5 hectares in size. To account for these situations, we have applied an 8% net down to the hardwood volume within the General Forest Zone.

It is important to note that all of these net downs, with the exception of the Operational Blocking constraints, also apply to the blocked Management Plan. This means that the computer analysis results should be further reduced by 9% for spruce/fir/Jack Pine, 20% for hardwood, 35% for White Pine, and 57% for Cedar in order to account for these real operational net downs. The AAC summary tables presented later in this Management Plan document have had these operational net downs applied.

Table 29 summarizes the specific "operational net downs" that we have utilized in this Management Plan for each species group.

Table 29. Operational net down percentages utilized in the Queens-Charlotte License Management Plan.

Reasons for "Net Down"	Net Down Percentage			
	Spruce/Fir /Jack Pine	Hardwood	White Pine Saw logs	Cedar Saw Material
Operational Blocking Constraints	15%	15%	15%	15%
Low Volume Inoperable Stands	5%	5%	5%	5%
Unmapped Streams	3%	4%	4%	4%
Structural and Biological Diversity	2%	5%	5%	5%
Product Yield Adjustment Factors	0%	0%	25%	50%
Hardwood Prescription Adjustments	0%	8%	0%	0%
Total Net Down before Blocking	23%	27%	45%	63%
Total Net Down after Blocking	9%	20%	35%	57%

THE BLOCKED MANAGEMENT PLAN

Based upon our aspatial baseline analysis and initial proposal (August 2000); we developed a Management Plan for the Queens-Charlotte License to meet the objectives outlined in DNRE's March 2000 document: "A Vision for New Brunswick Forests . . . Goals and Objectives for Crown Land Management." This plan was submitted for DNRE review and comment in April 2001. Based upon comments received we have further revised our Management Plan.

Our revised "blocked" Management Plan outlines the intended harvest areas, prescriptions, and treatment schedule for the 25-year period 2002-2026 on the Queens-Charlotte License. The specific blocking was done by our field forestry staff who normally plan and supervise the implementation of these operations on-the-ground.

In order to achieve a strategy that met all DNRE's objectives and obligations, yet optimized operational issues and concerns, more than seven blocking iterations were required. J.D. Irving, Ltd. staff have undertaken detailed analysis of the interim harvest blocking results, and have provided valuable feedback, to develop this blocked Management Plan. We believe that the management plan we have proposed for the Queens-Charlotte License is the best strategy to meet DNRE's stated objectives for Crown land management.

Table 30, shows the prescriptions and area outlined for harvest over the next 25-years within the General Forest Zone on the Queens-Charlotte License. Clear-cut prescriptions will be utilized on 62% of the area within the first period. This level will drop to less than 35% in 2012.

Tables 31, 32, 33 and 34 summarize the blocked harvest volume from spruce/fir/Jack Pine, Hardwood, White Pine, and Cedar (respectively) from the General Forest Zone for the Queens-Charlotte License (For additional information see Appendix XIII). A summary of the area harvested by forest community type is shown in Appendix XIV.

Table 30. Proposed harvest area Summary for the General Forest Zone (only) on the Queens-Charlotte License.

Period	Total Harvests		Natural Stands						Managed Stands	
	All Prescriptions		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	ha	%	%	%	%	%	%	%	%	%
1	52,991	100%	60	3	10	6	7	10	0	4
2	54,686	100%	53	2	5	6	5	11	0	18
3	64,914	100%	30	2	10	13	4	20	1	20
4	54,623	100%	41	0	4	5	3	2	14	31
5	59,695	100%	10	0	1	0	7	21	25	36
Total	286,909	100%	39	2	6	7	5	13	7	21

Table 31. Blocked spruce/fir/Jack Pine harvest volumes for the General Forest Zone (only) on the Queens-Charlotte License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	3,300,872	3,003,794	100%	83	3	4	4	2	3	0	1
2	3,256,620	2,963,524	100%	79	2	2	3	2	3	0	9
3	3,277,052	2,982,117	100%	46	1	11	18	1	7	2	14
4	3,342,272	3,041,468	100%	48	0	2	3	1	1	29	16
5	3,209,491	2,920,636	100%	11	0	2	0	2	6	60	19
Total	16,386,307	14,911,539	100%	55	2	4	5	2	4	17	11
AAC	655,452	596,461	100%								

Table 32. Blocked hardwood harvest volumes for the General Forest Zone (only) on the Queens-Charlotte License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	1,598,206	1,278,565	100%	73	3	5	6	3	10	0	0
2	1,605,292	1,284,233	100%	74	2	3	4	4	12	0	1
3	1,799,710	1,439,768	100%	55	3	5	9	4	23	0	1
4	1,411,072	1,128,857	100%	70	0	3	8	3	3	8	5
5	1,414,341	1,131,472	100%	35	0	0	0	7	30	19	9
Total	7,828,621	6,263,495	100%	64	2	4	5	4	15	4	2
AAC[*1]	333,547	266,877	100%								

[*1] The hardwood AAC is calculated from 2002-2016

Table 33. Blocked White Pine harvest volumes for the General Forest Zone (only) on the Queens-Charlotte License.

Period	Total Harvest			Natural Stands						Managed Stands	
	All prescriptions (Gross)	Netted Down Saw Logs		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	230,014	149,509	100%	68	8	21	1	0	1	0	1
2	231,789	150,663	100%	54	16	17	1	0	0	0	12
3	302,970	196,930	100%	21	17	46	7	0	1	1	7
4	214,503	139,426	100%	41	1	13	4	0	0	27	14
5	273,990	178,093	100%	9	0	2	0	1	0	75	13
Total	1,253,266	814,621	100%	39	9	21	3	0	1	18	9
AAC	50,130	32,586	100%								

Table 34. Blocked Cedar Saw material harvest volumes for the General Forest Zone (only) on the Queens-Charlotte License.

	Total Harvest			Natural Stands						Managed Stands	
Period	All prescriptions (Gross)	Netted Down Saw Material		Variable Retention	Over story Removal	Shelter wood	Patch #2	Single Tree/Group Selection	Patch #3	Variable Retention	Commercial Thin
	m^3	m^3	%	%	%	%	%	%	%	%	%
1	198,585	85,391	100%	91	1	1	0	6	1	0	0
2	180,901	77,787	100%	92	1	1	0	4	2	0	0
3	166,898	71,766	100%	60	1	13	20	2	4	0	0
4	117,791	50,650	100%	90	1	3	3	2	1	0	0
5	50,456	21,696	100%	32	0	11	2	34	19	0	2
Total	714,631	285,594	100%	81	1	4	5	6	3	0	0
AAC	28,585	12,292	100%								

A summary of the harvest area and volumes by DNRE Region is also shown in Appendix XIII

It is important to note that, while we have blocked a 25 year Management Plan for the Queens-Charlotte License; we will be reviewing each and every harvest area in more detail at the Operating Plan level. The more detailed operating plan level review will undoubtedly lead to changes and adjustments, based upon stand, block level and operations conditions at the time. None-the-less, we believe the License level harvest area and volume by prescription forecasts are realistic, reasonable and achievable. However, some flexibility at the Operating Plan level is critical, and is expected.

Subsequent to the submission of our initial blocked 2002-2026 Management Plan in April 2001; DNRE has revised its opening size and adjacency policy (Mr. Volpe's letter of December 3, 2001). As a result of this change, we believe that the net long term impact will be a very slight AAC increase. Conservatively, we have increased the spruce/fir/jack pine AAC by 2,000 m3/year to account for this change. It should be noted that this volume is not included in the model run, nor in Tables 31-34.

LICENSE LEVEL INDICATORS

AAC Level

Our Management Plan for the Queens-Charlotte License provides a spruce/fir/Jack Pine AAC of 628,500 m^3/year over the next 25-year period. This level is approximately 8% above the 1997 plan levels. It will be possible to increase the harvest level by approximately 35% after 2050.

Our analyses indicate that a long-term hardwood AAC of 230,000 m^3/year is sustainable. Our Plan outlines harvesting approximately 20% above that level to 276,000 m^3/year for the period 2002-2016 and then reducing the harvest to the long term sustainable level of 230,000 m^3/year (this long-term level is still 4% above the 1997 Management Plan level). We feel that this is a reasonable and responsible strategy because it avoids the alternative of doing partial removal prescriptions, or delaying important silvicultural prescriptions in pure hardwood stands. We are confident that we can maintain the availability of hardwood high-grade products from the License, in spite of the reduction to the hardwood harvest level after 2016.

A sustainable yield of approximately 34,400 m^3/year of White Pine saw logs is possible from the License, according to our Management Plan. This level is a 42% reduction over the present allocation level from the Queens-Charlotte License (and 6% below the calculated AAC in the 1997 plan). This shortfall is serious for sawmills utilizing White Pine from the License. We hope to work with DNRE staff to develop alternative strategies to address this important issue.

In the long term, a flow of 4,800 m^3/year of Cedar saw material could be sustained from the land base. In the short term however, an average 12,500 m^3/year of Cedar saw material "falls out" of the blocked Management Plan over the next 25-years. This represents a 36% reduction to the present allocation level (and 9% below the 1997 Plan AAC) from the License. The issue of allocation levels and Cedar sustainability needs to be addressed jointly by DNRE and the cedar using industry in the province.

The total planned harvest levels by zone for the 2002-2006 and the 2002-2021 planning periods are summarized in Table 35.

Table 35. Harvest levels on the Queens-Charlotte License for the 2002-2026 management plan period (after all operational net downs).

Forest Zone	Harvest Levels (m^3/year)			
	Spruce/Fir/Jack Pine	Hardwood	White Pine Sawlogs	Cedar Saw Material
General Forest				
2002-2016	598,000	267,000	32,600	12,300
2002-2026	598,000	251,000	32,600	12,300
Protected Areas				
2002-2006	3,000	2,300	200	100
2002-2026	No harvest after 2011			
Unique Areas				
2002-2006	600	200	200	100
2002-2026	600	200	200	100
DWAMUs				
2002-2006	9,400	4,800	900	0
2002-2026	9,400	4,800	900	0
OLDSF Blocks				
2002-2006	5,500	1,500	200	100
2002-2026	5,500	1,500	200	100
Watercourse Buffers				
2002-2006	12,000	2,500	300	200
2002-2026	12000	2,500	300	200
Total License				
2002-2006	628,500	278,300	34,400	12,800
2007-2026	625,500	260,000	34,200	12,700

In addition, our Management Plan will provide "fall out" volumes of several minor species. These include Red Pine, Hemlock, Tamarack, and White Pine pulpwood. Table 36 summarizes the expected availability of these species/products for the 2002-2026 planning period.

Table 36. Fallout Volumes of Minor Species/Products from the 2002-2026 Queens-Charlotte License Management Plan.

Period	Fall Out Volume Availability - m^3/year				
	Red Pine	Hemlock	Tamarack	White Pine Pulpwood	Total
2002-2006	10,428	6,699	7,514	11,500	36,141
2007-2011	10,654	5,756	6,978	11,400	34,788
2012-2016	5,817	7,043	6,157	11,400	30,417
2017-2021	9,653	4,670	5,767	11,400	31,490
2022-2026	5,796	2,568	2,081	11,400	21,845
Average AAC 2002-2026	8,469	5,347	5,699	11,420	30,935

Silviculture Levels

A commitment on behalf of both J.D. Irving Ltd. and DNRE, to undertake an aggressive silviculture program is necessary and fundamental to ensure that the indicated AAC's are sustainable in the long-term. In total, a planting level of 3,224 hectares/year and a pre-commercial thinning level of 3,305 hectares/year must be maintained on the license. This total silviculture level is approximately 9% more than the level outlined in the previous plan, but 30% less than the actual program completed during the 1997-2000 period. The silvicultural requirement by zone is summarized in Table 37.

Table 37. Required silviculture levels on the Queens-Charlotte License for the 2002-2026 management plan period.

Forest Zone	Proposed Silviculture Level (hectares/year)				
	Planting	Pre-commercial Thinning			
		Softwood	Mixedwood	Hardwood	Total
General Forest Zone	3,161	2,321	669	220	3,210
Proposed Protected Areas	0	0	0	0	0
Unique Areas/Reserves	0	0	0	0	0
DWAMU's	20	60	0	0	60
OLDSF Blocks	43	35	0	0	35
Watercourse Buffers	0	0	0	0	0
Total License	3,224	2,416	669	220	3,305

A comparison of the 1993, 1997, and 2002 harvest and silviculture levels is summarized in Table 38.

Table 38. Comparison of 1993, 1997 and proposed 2002 Queens-Charlotte License management plan harvesting and silviculture levels.

Management Plan	Harvest Levels (m3/yr)				Silviculture Program (ha/yr)	
	Spruce/Fir /Jack Pine	Hardwood	White Pine Sawlogs	Cedar Highgrade Products	Planting	Pre-commercial Thinning
1993	540,500	177,500	30,000	22,125	1,940	1,430
1997	581,500	220,700	36,300	14,000	2,430	3,550
2000 September Proposal	642,400	289,100	19,830	7,920	3,210	3,295
April 2001 Submission	618,900	274,800	33,700	11,600	3,224	3,408
January 2002 Management Plan	628,500	278,300	34,400	12,800	3,224	3,305

Harvest Piece Size and Product Yield

The expected harvested piece size (m^3/tree) distribution and product yields for both softwood and hardwood according to this Management Plan. is depicted in Figures 13 and Figure 14.

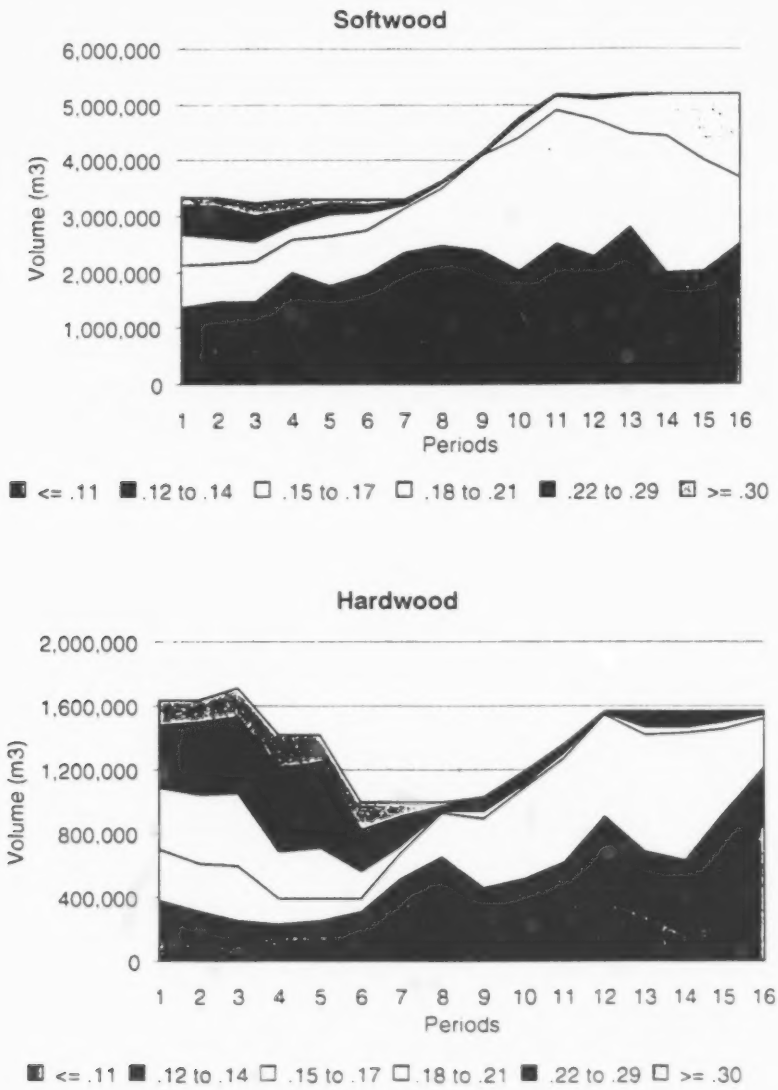

Figure 13. Piece size (m^3/tree) of softwood and hardwood over time.

There will be a noticeable and immediate transition to harvesting smaller softwood trees. This shift is a direct result of harvesting from managed stands. mostly in the form of commercial thinning. While the move to harvesting smaller managed wood is significant. it is not dramatic. The expected softwood product yield forecasts (Figure14) demonstrate that

the yield of pulpwood grade material will increase slightly and steadily, however the yield of log grade wood is not expected to substantially reduce.

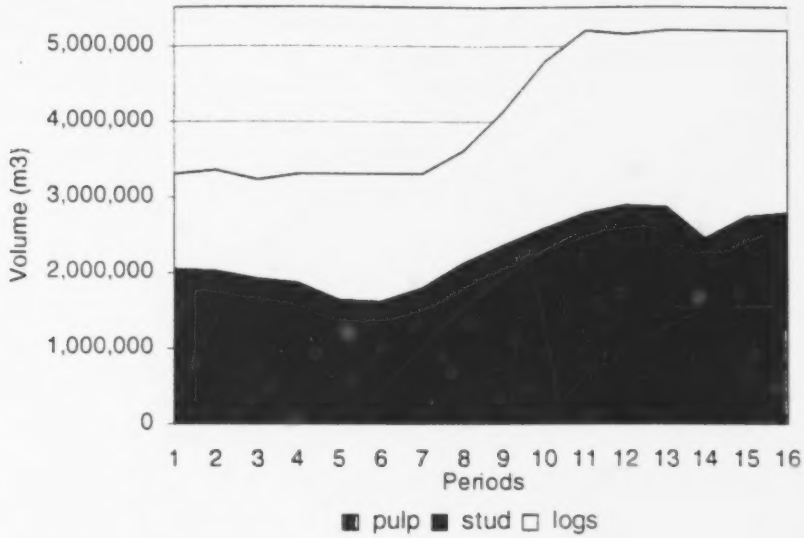

Figure 14. Product yield over time for Softwood on the Queens-Charlotte License.

The shift to a smaller softwood harvested piece size was discussed at the proposal stage with our Sub-Licensees. There was certainly no strong commitment from that group regarding the option to reduce the softwood harvest levels, in order to increase the future harvested piece size and large diameter saw log yields.

There is no significant change in the harvested hardwood piece size over the next 25-years of our Management Plan. After year 2027, however, there is a significant shift away from harvesting very large diameter harvested trees. This is not surprising given that at that time the major proportion of the hardwood AAC will come from operations in much younger managed stands, particularly previously pre-commercial thinnings. Figure13 clearly shows this forecasted trend.

We have not graphed the expected product yields from the hardwood AAC because historically, very low yields of hardwood veneer (less than 2% of total harvest) and premium hardwood saw logs (less than 3% of total harvest) have been delivered from the License. Through achievement of the silviculture objectives for hardwood management, these high-grade product yields should increase significantly in the long term. There are other opportunities to increase the high-grade yield from the Queens-Charlotte License, involving acceptance of smaller diameter saw logs. There is also potential to provide increased volumes of "pallet grade" hardwood from the Queens-Charlotte License.

Harvest Prescriptions

As previously noted, approximately 62% of the Period 1 harvested area will be done using clear-cut prescriptions. This level drops to less than 35% in 2012. This reduction is largely due to a shift to harvesting higher yielding managed stands, as well as the transition to commercial thinning prescriptions.

A summary highlighting the average sizes and size class distribution of clear-cut harvest prescriptions is provided in Table 39. The trends in harvest area size are well explained considering the shift to harvesting managed stands. The information summarized in Table 39 provides clear evidence that DNRE's policy to maintain clear-cut openings to less than 100 hectares in size is being well respected in the Queens-Charlotte License Management Plan.

Table 39. Average area distribution of clear-cuts proposed over the next 25-years on the Queens-Charlotte License.

Period	Average Clear-cut Size (ha)	Percent of area clear cut by Area size Class							
		< 10 ha	10-20 ha	20-30 ha	30-50 ha	50-70 ha	70-100 ha	100-110 ha	> 110 ha
1 2002-2006	31	3%	9%	15%	35%	31%	6%	0%	0%
2 2006-2011	29	4%	11%	16%	38%	24%	8%	0%	0%
3 2011-2016	30	3%	10%	15%	41%	25%	5%	0%	1%
4 2016-2021	28	5%	11%	15%	33%	25%	9%	0%	0%
5 2021-2026	28	5%	10%	10%	38%	26%	11%	1%	1%
25 - Year Average	26	4%	10%	15%	37%	27%	7%	0%	0%

In addition, and as part of the clear-cut opening policy; DNRE established guidelines regarding "adjacency". This policy indicated that clear-cut openings would be considered "adjacent" if the buffer between them was less than 200 meters in width, and the regeneration was less than 2 meters in height (or less than 10-years old). Clear-cut openings that shared a boundary of less than 50 meters in length would not be considered adjacent. As part of our harvest blocking efforts we have analyzed and adjusted our harvesting blocks to ensure that our Management Plan for the Queens-Charlotte License respects the adjacency policy. The "Stanley" blocking and analysis software was indispensable in carrying out this analysis and ensuring that our blocking was consistent with this objective.

Forest Communities

This Management Plan has integrated the softwood, hardwood, White Pine, and Cedar forest communities into a single integrated management strategy for the Queens-Charlotte License. We have not recognized any distinct softwood, hardwood, White Pine or Cedar harvest blocks in this Management Plan. We have, however, developed very specific prescriptions to be utilized in different forest communities. The prescriptions and their eligibility for use has been outlined in previous sections, and appendices of this Management Plan.

Spruce/Fir/Jack Pine

More than 95% of the spruce/fir/Jack Pine AAC is derived from the General Forest Zone of the Queens-Charlotte License. While initially, only 1% of the AAC comes from intensively managed stands; previously planted or pre-commercially thinned areas provide more than 45% of the harvest volume by 2017. Commercial thinning is a significant portion of the harvest under this Management Plan, going from 3% of the harvest area in 2002 to a high of 19% of the harvest area after year 2022.

Hardwood

More than 95% of the hardwood harvest comes from the General Forest Zone in the Management Plan. Over the next 5 years, approximately 38,000 m^3 comes from hardwood silvicultural treatments (single-tree and group selection prescriptions) in predominately hardwood stands. In the long term (30-years from now), a greater portion of the hardwood AAC will come from intensively managed stands, mostly pre-commercially thinned areas.

White Pine

Almost 95% of the White Pine harvest comes from the General Forest Zone. More than 75% of the White Pine harvest would be considered "fallout" from "traditional" spruce/fir harvest prescriptions. We have however developed strategies focussed on improving the long term yield and quality of White Pine harvested from the License. These include:

- White Pine shelterwood harvest prescriptions,
- favoring White Pine natural regeneration,
- White Pine focussed pre-commercial thinning,
- White Pine planting and inter planting,
- under planting White Pine, and
- pruning.

We have modified and adjusted the above noted prescriptions in order to favour White Pine in the long term. These strategies and treatments have been reviewed and approved by DNRE staff. White Pine prescriptions will be designated for, and utilized in appropriate stands that have the potential for improved White Pine yields. Over the next 25-years, approximately 25% of the White Pine harvest volume will come from special White Pine management areas.

Cedar

More than 96% of the Cedar harvest is scheduled to "fallout" from the General Forest Zone. Only a very small portion of the cedar AAC is scheduled to come from the Cedar forest community. This is not surprising, because most of the Cedar stands on the Queens-Charlotte License are presently located in constrained forest zones (DWAMU's and OSFH); where harvesting is not the primary management objective. As previously noted, the issue of Cedar allocations and the sustainability of the Cedar resource is an issue that must be jointly addressed by DNRE and the cedar using industry in the province.

Biological Diversity and Community Level Objectives

As previously noted, DNRE also established biodiversity and forest community level objectives for each eco-region on the Queens-Charlotte License. In reviewing these objectives, several of the communities are not sufficiently represented on the license at the present time. Those under-represented forest communities are noted in Table 40. In light of the fact that these 4 communities are not presently discernable on the Queens-Charlotte License based upon the broad forest stratification utilized, we feel that DNRE should review and revise their forest community objectives.

Table 40. Forest communities on the Queens-Charlotte License that are presently represented below DNRE objective levels.

Forest Community/Eco-Region	Present 1999 Level Hectares	DNRE objective levels Hectares
THSW 4	29	280
THSW 6	0	2,610
THSW 7	0	610
BF 3	0	310

We have modified and adjusted our harvest plans in our proposed strategy to ensure that the established biodiversity and community level objectives are respected. A detailed summary of these objectives, and the levels maintained according to our proposed strategy is summarized in Table 41. It should also be noted, that while 4 communities types are under represented according to the broad forest stratification utilized, we will take action to maintain these under represented communities when they are encountered and identified on the ground. Specifically, any stands identified on the ground that meet under represented community type criteria will be designated and maintained until the point that the community level thresholds have been successfully achieved.

Table 41. Biodiversity and Community Level Objectives for the Queens-Charlotte License for the 2002-2026 Management Plan

Forest Community by Eco-Region	Target	Present Level	Period 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
thp reg3	700	2949	2894	2940	2756	2723	2341	2014	1930	1922	1916	1918	1914	1901	1893	1887	1887	1886
thp reg5	3,340	6956	7236	9197	8275	7942	6190	3895	3587	3694	3726	3695	3669	3623	3645	3613	3547	3465
thsw reg3	560	4632	4459	4457	4028	3863	3731	3037	2915	2885	2914	2825	2817	2831	2829	2761	2760	2731
thsw reg4	280	29	38	38	43	43	51	51	51	52	51	52	51	51	53	51	61	61
thsw reg5	4,260	15006	14371	14427	12237	11160	9876	7339	6941	6766	6699	6642	6677	6617	6532	6449	6413	6287
thsw reg6	2,610	0	0	0	10	13	13	13	12	16	19	25	24	39	40	69	87	134
thsw reg7	610	0	0	0	1	1	1	1	1	1	1	1	1	2	4	6	11	17
sp reg3	1,710	8714	7681	7302	6327	6245	6214	6081	6071	6133	6436	6501	6471	6465	6091	6062	5602	5246
sp reg4	1,570	2518	3057	3391	3837	3877	3931	4115	4192	4196	4214	4308	4351	4789	4779	4763	4777	4670
sp reg5	11,100	46670	40623	36497	32494	30358	29420	29660	29614	29408	29934	31099	31621	31564	31806	31096	30833	27410
sp reg6	3,470	11737	10464	9416	7272	6363	6313	6270	6234	6362	6631	7034	7327	7507	7801	7563	6966	6565
sp reg7	950	1152	1222	1096	1031	1008	1004	1010	1004	995	1109	1184	1231	1359	1434	1329	1268	1247
bf reg3	310	0	0	0	19	61	139	182	679	1337	2025	2202	1774	1714	1676	1707	1744	1758
bs reg5	3,980	16374	15135	14370	13549	12297	12232	12118	13083	13031	12834	13542	13881	14636	14218	14201	12186	11773
bs reg6	8,000	29984	26436	23527	20907	19638	20739	20952	21271	21111	22062	23123	24319	24527	24543	23051	22677	19353
bs reg7	1,280	5733	4868	3926	3081	2697	2648	2770	2800	2985	3028	3224	3042	3221	3347	3290	3120	2563
ce reg4	240	1148	1280	1369	1411	1359	1286	1303	1310	1326	1313	1326	1261	1250	1163	1145	1053	1026
ce reg5	1,680	9806	9465	9366	9271	8979	8954	8978	8951	8935	8925	8922	8831	8746	8684	8575	8397	8303
reg4	80	150	144	177	182	182	191	224	224	223	223	222	209	211	190	193	198	199
p reg5	1,080	3930	3998	3684	2768	2473	2528	2718	2671	2641	2603	2565	2294	2285	2070	2084	1797	2240
reg6	2,030	3033	3085	2774	2072	2034	2033	2063	2054	2046	2039	2031	2046	2030	2230	2280	3464	4027
p reg7	190	350	351	261	207	191	191	210	204	198	193	190	218	198	214	216	242	308
jp reg6	2,620	7245	6129	5360	4061	3415	3513	3499	3525	3672	3928	4045	4074	3981	3786	3557	3526	3456
jp reg7	180	617	567	369	428	334	309	308	316	369	386	392	393	392	392	389	382	372
ohwh reg3	200	8413	8373	8567	8057	7774	7302	6394	6105	6301	6376	7246	7250	7305	7280	7411	7239	7283
ohwh reg4	180	2200	1993	1731	1518	1314	1094	864	752	1016	969	925	980	868	708	624	588	591
ohwh reg5	1,830	33490	32041	33937	29255	26868	21949	16597	15686	16785	17416	17176	16504	16020	15581	15283	14629	14631
ohwh reg6	920	13220	13037	12354	9439	7514	6525	5356	4806	4533	5520	5579	5904	6373	6252	5731	5722	5332
ohwh reg7	280	5160	5336	4942	4251	3085	2289	1630	1376	1236	1845	1776	1504	1411	1356	1296	1240	1018
osfh reg3	1,760	10296	9027	8692	7490	7429	7441	7341	7871	8600	9633	9982	9228	9227	8811	8665	8077	7723
osfh reg4	1,330	6291	7049	7293	7616	7467	7621	7853	7990	8102	8277	8654	8969	9503	9615	9439	8850	8528
osfh reg5	13,790	74900	67836	62779	56929	53180	52346	52762	54995	55319	55986	58233	59432	60596	61243	58411	54134	52693
osfh reg6	9,980	50525	44860	40991	35083	32825	34030	35093	35908	36599	40182	42473	41906	42840	40629	38394	32935	31596
osfh reg7	1,810	8551	7732	6517	5264	4694	4642	4969	5317	5844	6286	6725	6446	6976	6876	6515	6145	5524
omwh reg3	860	5532	4989	4881	4293	4138	4200	4190	4250	4542	4995	5627	5428	5503	5482	5542	5529	5601
omwh reg4	680	2262	2317	2173	2112	1913	1931	1902	1871	2218	2278	2262	2650	2813	2676	2714	2476	2461
omwh reg5	6,020	31270	28060	26418	22371	20376	18226	15759	15881	17058	18065	18548	18018	17567	17463	17258	17452	18772
omwh reg6	3,430	13760	12121	11365	9075	7968	7440	7251	6994	7035	9123	9962	10550	10390	9872	9530	9954	10219
omwh reg7	990	4451	4181	3747	3108	2388	2044	1961	2112	2087	2931	3015	2696	2500	2192	2106	2093	1963
lmwh reg3	100	191	344	490	436	400	462	419	407	401	512	503	580	569	571	1006	1091	1123
lmwh reg4	120	452	558	676	593	513	381	335	290	274	279	432	348	319	413	352	316	324
h reg5	980	3734	3936	3725	3444	3221	3207	3285	3536	3883	4355	4730	5418	5485	5909	5644	5250	4744
h reg6	540	2092	2185	2041	2250	1891	1713	1510	1449	1635	1635	1518	1450	1281	2221	1656	1699	1369

Growing Stock

The growing stock trends of the major species groups, under our management strategy for the Queens-Charlotte License are shown in Figure 15. The spruce/fir/Jack Pine growing stock levels are especially noteworthy, because we are now at the low point, with a steady and increase shown over the next 40-years. This is clear evidence of the benefits from the intensive silviculture treatments (planting and pre-commercial thinning) on the land base over the past 20-years.

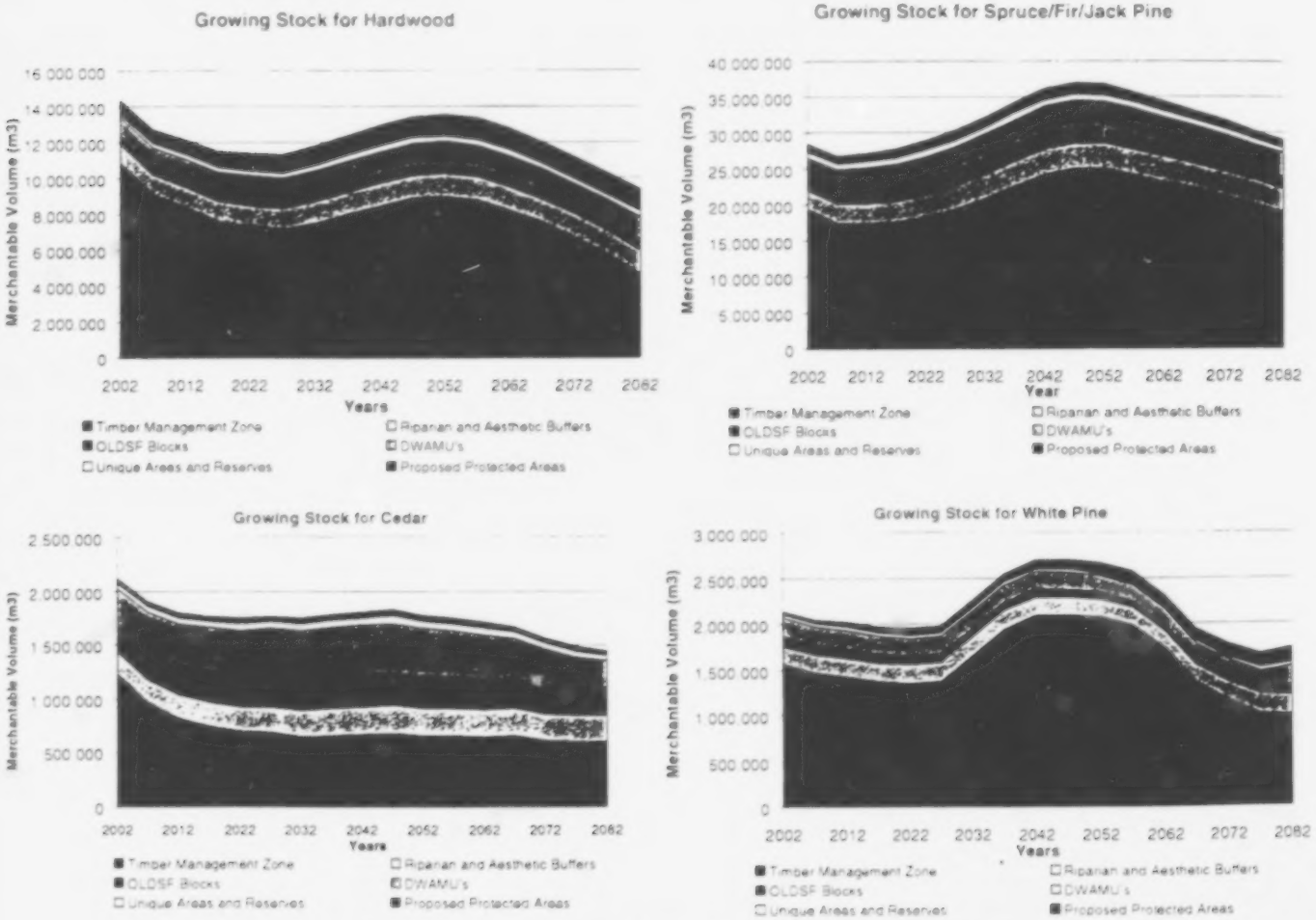

Figure 15. Total Merchantable Growing Stock of Spruce/Fir/Jack Pine, White Pine, Hardwood, Cedar over time on the Queens-Charlotte License.

The Wood and Habitat Supply Analysis

A digital copy of our wood and habitat supply model and analyses is available for DNRE's review. More details in this regard are included in Appendix XV.

Harvest Blocks

Harvesting within the General Forest Zone has been specifically blocked by location, prescription and scheduled 5-year operating period. A series of 1:125,000, 1:50,000 and 1:25,000 map products have been produced that clearly shows this information (Appendix XVI). In addition a detailed block summary has been compiled, detailing the areas and species volumes by 5-year period, over the 25-years of this Queens-Charlotte License Management Plan. The information is presented in Appendix XVII.

DISCUSSION AND RECOMMENDATIONS

We believe this Management Plan for the Queens-Charlotte License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for Crown land management. We are comfortable that our strategy is responsible and achievable from environmental, economic, and social aspects. There are, however, several important issues that bear reiteration and further discussion.

AAC Levels

As previously noted, this 2002-2026 Queens-Charlotte License Management Plan outlines a spruce/fir/Jack Pine AAC 8% above the 1997 Plan levels. The proposed hardwood harvest is up by more than 26% compared to previous levels. The white pine saw log AAC has decreased by 40% from present allocation levels. Cedar saw material fallout over the next 25-years, is down by more than 9% compared to the 1997 plan, and down by 36% compared to the present allocation level. It is important to note that this "fallout" level is not sustainable in the long term. A long term cedar saw material AAC of 4,800 m^3/year would be more aptly considered the sustainable level.

As a result of the investment in silviculture, there is a great opportunity to significantly step up the spruce/fir/Jack Pine AAC in the long term. Our analyses indicate that it will be possible to increase the present spruce/fir/Jack Pine AAC by approximately 35% after 2050.

The hardwood management strategy outlined in this Queens-Charlotte License Plan reflects harvesting approximately 278,000 m^3/year for the next 15-years, then reducing to a long term AAC level of 230,000 m^3/year. We consider this short term accelerated hardwood harvest to be a reasonable and responsible strategy because it allows us to do important hardwood silvicultural prescriptions, and avoid excessive use of partial removal harvest prescriptions.

The shortfall of the newly calculated White Pine AAC compared to the present allocations levels (-42%) is a serious issue. We are seriously pursuing White Pine management opportunities on Licenses #6 and #7. There are however significant areas of White pine on other Licenses in the province. With management, there is a significant opportunity to considerably increase the White Pine AAC from Crown land, without compromising present spruce-fir AAC levels. We fell very strongly that DNRE and all Licensees should investigate and pursue strategies to grow and harvest more White Pine.

Recommendation: We recommend that DNRE adopt a policy to increase the White Pine AAC from Crown land; by practicing White Pine management in appropriate areas, and committing to an intensive White Pine silviculture program.

Cedar

The sustainability of the Cedar resource on Crown land is also a serious issue. The present cedar allocation level on the Queens-Charlotte License is 400% greater than the long term sustainable supply, and 55% greater than the short term availability. We understand that the situation is similar on other Crown Licenses. We believe that it is most important that DNRE and the Cedar industry work together and address this serious issue. Possible solutions might include industry diversification to utilize present "cull" Cedar; and investment in Cedar silviculture.

Recommendation: We recommend that DNRE and the Cedar industry review the issue of Crown land and Cedar resource sustainability.

Harvest Piece Size Trends

This Management Plan covers a time period when there will be a significant transition to harvest operations in managed stands (from 1% of the harvest volume in 2002 to more than 45% by 2017). Not surprisingly, this transition will result in a downward shift in harvested piece size. Specifically, there will be a reduced flow of large diameter saw logs while the vast majority of the harvest volume is smaller diameter stud wood. It is important to note that our Sub-Licensees did not favor reducing the harvest level from the License in order to provide a (slightly) larger harvested piece size. It is also important to note that we feel that this transition to smaller wood can be managed and coordinated. The expected harvest piece size and product yield trends have been demonstrated (Figures 13 and 14) and discussed in this Management Plan document.

Commercial Thinning

Commercial Thinning is both an important harvest prescription and an important silviculture treatment. It is fundamental to our management strategy on the Queens-Charlotte License. From a wood cost perspective, commercial thinning operations are dramatically more expensive than all other harvest prescriptions. This is not surprising, considering the lower productivity and smaller harvested piece size of these operations. It is also important to note that wood from commercial thinnings is generally considered inferior by the sawmill and pulp or paper industries due to the larger ring size, and the higher proportion of juvenile wood. Within this Management Plan, we have approximately 300 hectares per year of commercial thinning scheduled in Period 1. This level quickly rises to 2,000 hectares per year by 2007.

Recommendation: We recommend that DNRE consider recognizing commercial thinning prescription costs, and silvicultural benefits; by providing a per hectare silvicultural reimbursement, or by providing a reduced royalty charge for commercial thinning.

Silvicultural Treatments:

Our intensive silviculture program is the foundation necessary to realize the increased growth, and derive the planned harvest levels from the Queens-Charlotte License. The required and planned tree planting and pre-commercial thinning treatments are up by 9% in this Management Plan compared to the previous plan, and down by more than 30% compared to the program actually carried out during the 1997-2000 period. The planned silviculture program must be implemented in order for the indicated harvest levels to be sustainable and available in the long term.

While planting and pre-commercial thinning are the noted activities with prescribed levels; it needs to be recognized that other inter-related programs must also be undertaken. Some of these activities include:

- Commitment to continue to invest in a Tree Improvement Program.
- Commitment to continue to supply the seedlings necessary for the planned tree planting program.
- Commitment to support site preparation treatments prior to tree planting.
- Commitment to undertake the required competition control program in planted or naturally regenerated areas, in order to maintain future crop trees free to grow.
- Commitment to support an intensive silviculture programs specifically focussed on white pine.

We have made note of these programs and necessary commitments because over the past several years we have had difficulty procuring sufficient trees for our planting program, and getting the necessary competition control treatments approved.

Recommendation: We recommend that DNRE ensure that they are committed to provide funding for the total silviculture program prescribed in this Management Plan, including providing sufficient seedlings, and providing funding and approval to maintain all (past and present) planted areas free to grow.

Protected Areas

As previously discussed, more than 4% of the Queens-Charlotte License area is part of the proposed "Protected Areas". The impact of this loss to the "working forest" is a reduction of more than 15,000 m^3/year of available harvest. Some mitigation of this loss for the Queens-Charlotte Licensee and Sub Licensees is necessary.

Recommendation: We recommend that DNRE mitigate the loss to the working forest caused by the establishment of 22,653 hectares of "Protected Areas" on the Queens-Charlotte License; by incorporating unallocated adjacent Crown lands into the Queens-Charlotte License.

Adjacent Crown Lands:

Over the past 20 years, DNRE has purchased two large tracts of forestland. These include the former Pejepscot lands in southeastern New Brunswick, and the former Georgia Pacific lands in southwestern New Brunswick. It has also recently come to our attention that there are significant areas of unallocated Crown owned forestland, particularly southeastern New Brunswick. In total, we believe that there is more than 150,000 hectares of unallocated Crown forest in the province. Much of this land is directly adjacent to the Queens-Charlotte License.

Recommendation: We recommend that DNRE review the status of the unallocated Crown forestland in the province, and incorporate these areas into the adjacent Crown Licenses.

Deer Wintering Area Management

The province of New Brunswick has developed a credible and science-based approach to management and long term maintenance of recognized deer wintering habitat management. We are, however, concerned that DNRE needs to further review its interpretation, criteria, and management objectives related to "Moderate Winter Deer Habitat". We feel that the criteria and objectives related to moderate winter deer habitat are overly and unnecessarily restrictive.

Recommendation: We recommend that DNRE staff should review and revise the definition of, criteria for, and management objectives related to "moderate winter deer habitat" within DWAMUs.

We are also concerned about the very small (less than 100 hectares in size) deer wintering areas (and DWAMUs) designated on the Queens-Charlotte License. It is not realistic or practical to do detailed DWAMU Management Plans, under the present DNRE requirements, for such small areas. We feel that DNRE should develop alternative management plan requirements specifically for very small DWAMUs.

Recommendation: We recommend that DNRE staff in consultation with Licensees, should develop alternative streamlined management plan requirements for very small (less than 100 hectares in size) DWAMUs.

Old Spruce/Fir Habitat (OSFH) Blocks

Based upon the previous MCFH objectives from previous Management Plans, DNRE has established new criteria for OSFH blocks. While we support the need for specific management objectives related to old spruce/fir habitat, we have some major concerns related to the OSFH block objectives. These include:

- The habitat windows assigned to managed stands.
- The present OSFH block size objectives based upon the Marten are not supported by

local scientific research.

- In many instances, the Eco-region based OSFH block objectives are not achievable or realistic.
- The OSFH block objectives should reviewed in light of the establishment Protected Areas in the province and specifically on the Queens-Charlotte License.

We are also concerned about the OSFH block objectives as we transition to subsequent Management Plans. New OSFH blocks are selected and designated at least one year (and sometimes two years) prior to a new Management Plan taking affect. It has been our experience that large areas of the "General Forest Zone" are unnecessarily constrained in this exercise.

Recommendation: **We recommend that DNRE staff, in consultation with Licensees, review and revise the OSFH block criteria and objectives, to be ready well in advance of preparation of the 2007 Management Plans.**

Forest Community Objectives

A new requirement for the 2002 Management Plans was the establishment of additional wildlife habitat objectives. These objectives were related to old and late succession stages for all major forest communities. Objectives were established for each major forest community type in each Eco-region. Unfortunately these objectives were set without having looked at the present levels, and distribution of these habitats. Several community types (THSW in Eco-regions 4, 6 & 7, and Balsam Fir in Eco-region 3) are not present on the License at the target objective level. In these situations, we have taken steps not to further compromise these habitats. Specific stands that we encounter and identify on the ground meeting these under represented community criteria, will be designed and maintained until the point that the threshold has been successfully achieved.

Recommendation: **We recommend that DNRE review the updated forest inventory and establish more realistic and achievable forest community level objectives for the Queens-Charlotte License.**

Harvesting in Non-Timber Zones

Within this Management Plan, a strategy is specifically proposed for each of the non-timber zones on the Queens-Charlotte License. The strategies include a specified level of active management and harvesting within each forest zone. It is important that DNRE staff (Branch, Region and District) have reviewed these plans and are accepting of, and approve the levels of activity; particularly the harvesting within non-timber primary objective zones. It is also important to recognize that harvest operations must be economically viable and logistically possible. Some road construction within these non-timber zones will be necessary. Operationally practical levels of removal will need to be accepted and approved.

Recommendation: We recommend that all levels of DNRE (Branch, Region and District) have the opportunity to review the comment on this Management Plan, prior to its approval by DNRE senior management.

Incorporating New Objectives:

Many DNRE policies and objectives are unfortunately established as constraints. Examples in this regard include the proposed Protected Areas, the tolerant hardwood policy, and the new forest community objectives. As such, there is a constant eroding of the "working forest" land base. We request that new policies and objectives be developed jointly by DNRE in consultation with Licensees and Sub-Licensees. We believe that this approach would lead to more consensus and buy in than the win/lose conflict that often presently occurs. Furthermore we feel very strongly that DNRE should adopt a policy that states: "All land use decisions or objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land." We believe that such a policy would stimulate all stakeholders to reach compromises and consensus on important resource issues.

Recommendation: We recommend that the government of New Brunswick adopt a policy that "All land use decisions and Crown land Management objectives must not further compromise the present or long term harvest level from New Brunswick's Crown land."

Doubling the Wood Supply:

In order to realize the full economic potential of New Brunswick's Crown Land, we feel that it is necessary to have explicit wood supply objectives. Since 1982 there have been numerous discussions between industry representatives and senior DNRE staff regarding adopting an objective: "To double the wood supply within 40 years". This goal is readily achievable and compared to other benchmark jurisdictions it is somewhat conservative. Some additional tree planting and minor adjustments to DNRE's "Acceptable Natural Regeneration" and Plantation Establishment policies would be necessary to achieve this objective on the Queens-Charlotte License. If DNRE were to adopt an objective to double the long term wood supply, we could readily develop a new management plan for the Queens-Charlotte License to realize this objective by 2040.

Recommendation: We recommend that the government of New Brunswick establish Crown License management objectives and related performance criteria focussed on doubling the sustainable harvest by 2040.

CONCLUSION

Over the past two years we have submitted evolving drafts of our proposed 2002-2026 Management Strategy and plans for the Queens-Charlotte License to DNRE for review. We have carefully considered the comments received, and we have revised our strategy and proposed Management Plan accordingly.

We believe that this blocked 25-Year Management Plan for the Queens-Charlotte License meets the New Brunswick Department of Natural Resources and Energy's goals and objectives for the Crown Land Management. We are confident that we can implement this strategy on the ground consistent with DNRE's present policies and procedures.

We are proud of this Management Plan and we feel that it is environmentally, economically, and socially responsible.

J.D. Irving, Limited
January 21, 2002

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